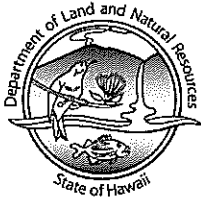


LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
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LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAIHOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

NATURAL AREA RESERVES SYSTEM COMMISSION (NARSC) MEETING

DATE: April 6, 2009
TIME: 8:30 a.m. – 5:00 p.m.
PLACE: DLNR Board Room, 1151 Punchbowl Street, Honolulu

AGENDA

1. Call to order and introduction of members.
2. Approval of Minutes of the September 15, 2008 NARSC Meeting.
3. Approval of Minutes of the October 7, 2008 NARSC Subcommittee Meeting on Enhancement.
4. Legislative Update, NAR Fund Status, and NARS Budget Update for FY09/10: Randy Kennedy.
5. **NARS Staff Updates.**
 5. a. Maui Operational Update: Bill Evanson.
 - i. Progress on Closure/Action Plan at `Ahihi-Kina`u: Matt Ramsey.
 - ii. Possible removal of Roi (*Cephalopholis argus*) from `Ahihi-Kina`u: Discussion
 5. b. Hawai`i Operational Update: Lisa Hadway.
 - i. Status of current volcanic activity at Kahauale`a: Discussion and Action Recommending Continued Closure of the Reserve.
 5. c. O`ahu Update: Brent Liesemeyer.
 5. d. Kaua`i Operational Update: Michael Wysong.
6. **Permitting.**
 - 6.a. Plant Extinction Prevention and Threatened & Endangered Species Program Updates.
 - 6.b. Permit Report: Hawai`i Tropical Experimental Forest at Laupahoehoe: Boone Kauffmann, Institute for Pacific Islands Forestry.
 - 6.c. Special Use Permit Summary: Discussion of Current Delegation of Authority.
 - 6.d. Special Use Permit Application: Dr. Michael Hadfield, University of Hawai`i to continue to monitor, survey for, and handle endangered O`ahu tree snails in the genus *Achatinella*, in Pahole and Ka`ala Natural Area Reserves; to take minute tissue samples for genetic analyses; as well as to maintain in captivity, colonies of snails for captive propagation as well as for future release back into the wild as deemed appropriate. Action by the NARS Commission to review, approve, defer, make other recommendations, or deny recommendation to the Board of Land and Natural Resources.
 - 6.e. Special Use Permit Renewal Application: Army Natural Resources to continue specific actions for the stabilization of 29 plant species in Ka`ena, Ka`ala, and Pahole Natural Area Reserves, as well as monitoring and surveying for endangered O`ahu tree snails in the genus *Achatinella* in Ka`ala and Pahole Natural Area Reserves, O`ahu. Action by the NARS Commission to review, approve, defer, make other recommendations, or deny recommendation to the Board of Land and Natural Resources.
 - 6.f. Current status of Memorandum of Understanding Between the Army and Department of Land and Natural Resources for Actions on Lands Under State Jurisdiction.
 - 6.g. Special Use Permit Application: Richard Pender, University of Hawai`i, to conduct research on the following endangered plant species in Pahole Natural Area Reserve, O`ahu (*Delissea subcordata* and *Cyanea superba* subsp. *superba*) and Pu`u O `Umi Natural Area Reserve. Hawai`i (*Clermontia*

drepanomorpha), as well as other non-listed lobeliads. Action by the NARS Commission to review, approve, defer, make other recommendations, or deny recommendation to the Board of Land and Natural Resources.

7. Enhancement: Emma Yuen.

7.a. Extension of Kahauale`a NAR, Hawai`i: Proposal for discussion and referral to DOFAW for further review.

7.b. Kaluanui NAR O`ahu: Proposal for discussion and referral to DOFAW for further review.

7.c. `Ilio Point NAR/Wildlife Sanctuary, Moloka`i: Proposal for discussion and referral to DOFAW for further review.

7.d. Recommend opportunities or strategies for conservation management and designation of Biologically Important Areas statewide (Namolokama, Kalalau Back Pali, North of Kui`a, Upper Koa`ie, Blue Hole, Kaluanui, Back of Wailau and South Slope, `Ilio Point, East of Wailau, Lana`ihale, Hanawi West/East, Kahikinui/Nakula, Kanaio Coast, Kauaula/Puehuehunui, Northwest of Pu`u O `Umi NAR, Kamilo, Kahauale`a Extension/Tract 22, Pohakuloa Gulch, Ka`u, Waiea, Cliff above Pebble Beach, Mauna Loa, Waimanu, Hamakua, Puna Lowland Wet Forests).

i. Summarize past Enhancement discussions and process.

ii. Summarize DOFAW island branch discussions of biological information and other issues in each biologically important area: Flint Hughes, Trae Menard, Jim Jacobi.

iii. Discuss and formulate recommendations for each Biologically Important Area.

7.e. Discussion and recommendations for acquisition opportunity at Honouliuli, O`ahu.

7.f. Discussion and recommendations for conservation in the Department from an organizational standpoint.

8. Announcements. Update on *Myoporum* (naio) thrips: Pat Conant; Status of nominations to the NARS Commission; Set next meeting date.

9. Adjournment.

Meeting materials are available for public review in advance of the meeting. Contact the NARS Commission Executive Secretary. If you require special assistance or auxiliary aids or services to participate in the public hearing process (i.e. sign language interpreter, wheelchair accessibility, or parking designated for the disabled), please contact the NARS Commission Executive Secretary 72 hours prior to the meeting so that arrangements can be made (808) 587-0063.

**MINTUES OF THE SEPTEMBER 15, 2008 NATURAL AREA RESERVES
SYSTEM COMMISSION (NARSC) MEETING, HONOLULU**

COMMISSIONERS PRESENT:

DRAFT Subject to approval

Dr. Dale Bonar, Chair

Dr. James Jacobi

Ms. Sylvianne Yee

Mr. Richard Hoeflinger

Mr. Scott Derrickson, for Director, Office of Planning (OP)

Mr. Patrick Conant, for Director, Department of Agriculture

Mr. Ken Kawahara, for Director, Department of Land and Natural Resources (DLNR)

Dr. Sheila Conant, for President, University of Hawai`i

Ms. Colleen Murakami, for Superintendent, Department of Education

COMMISSIONERS ABSENT:

Dr. Scott Rowland, Vice Chair

Mr. Trae Menard

Dr. R. Flint Hughes

Mr. Patrick Conant, for Director, Department of Agriculture

STAFF:

Ms. Linda Chow, Deputy Attorney General (AG)

Ms. Betsy Gagné, DOFAW

Ms. Christen Mitchell, DOFAW

Mr. Randy Kennedy, DOFAW

Ms. Lisa Hadway, DOFAW

Mr. William Evanson, DOFAW

Mr. Brent Liesemeyer, DOFAW

Ms. Marigold Zoll, DOFAW

Ms. Emma Yuen, DOFAW

VISITORS:

Mr. Chris Brosius, West Maui Mountains Watershed Partnership

Mr. Mark White, The Nature Conservancy (TNC)

Ms. Kathy Tachibana, TNC

Dr. Sam Gon, TNC

Ms. Stephanie Lu, TNC

Ms. Teresa Dawson, Environment Hawai`i

ITEM 1. Call to order. Chair Bonar called the meeting to order at 9:05 a.m., followed by Commissioners introducing themselves; others in attendance introduced themselves.

ITEM 2. Approval of Minutes of the June 30, 2008 NARSC Meeting.

MOTION: S. Conant/Hoeflinger moved that the NARS Commission approve the Minutes of the June 30, 2008 NARS Commission Meeting. Motion carried unanimously.

ITEM 3. Strategic Plan: Review, discussion and action. Chair Bonar summarized the strategic planning process and especially thanked Staff Mitchell and Member S. Conant for their re-write of the plan, and then opened discussion for any further comments. The bulk of the discussion revolved around implications for Branch NARS managers and their ability to develop and follow operational plans that reflect and implement the strategic plan, given their own limitations with existing staff workloads, budget constraints and the uncertainty of long-term funding, and word-smithing. Chair Bonar re-emphasized the need for annual operational plans, following the standards set by Staff Hadway, feeling they would provide guidance to the Commission and help with decision-making. Member Jacobi acknowledged that different islands have different resources and needs.

Staff Hadway was concerned about unforeseen circumstances affecting operational plans and staff ability to take on any additional workloads. Staff Liesemeyer said he and his staff are working on their operational plan; he was also concerned how to address additional areas, including geological features.

MOTION: JACOBI/MURAKAMI moved that the NARS Commission accept and recommend with minor modifications, the NARS Strategic Plan, to the Board of Land and Natural Resources for their final review and approval.

Discussion continued with Member Jacobi suggested in the planning process to define metrics and to work with staff to clarify goals and metrics for standardized monitoring. Chair Bonar replied that a lot of this falls on Staff Kennedy to work with the Branches to see to this; we understand the challenges to monitoring; however, the Plan is also a dynamic working document, not meant to sit on a shelf but to help push legislative and staff buttons.

Member Derrickson asked why this was being sent to the Board; AG Chow replied that the Board is the oversight body for the Department, so this action is appropriate. They can also direct staff to implement the plan, since the staff is under their direction.

With no further discussion Chair Bonar called for the question. **Motion carried unanimously.**

ITEM 4. Action Item: Discussion and action on scope, membership, and appointment of a Task Force on Conservation management. This Task Force was one of the steps identified for implementing the Strategic Plan, relating to Goal 8: Inventory of Ecosystems and Lands in the NARS. One of the major responsibilities envisioned for this task Force would be to meet with various entities before the Commission officially recommends an area for NARS designation, to discuss options for management and whether NARS designation could achieve those conservation goals. Staff Yuen will be coordinating this; there are a lot of things that need to be discussed to trim or focus the existing list.

MOTION: S. CONANT/YEE moved that the NARS Commission establish a Task Force on Conservation management with major responsibility for reviewing potential NARS and NAPP proposals and meeting with various interests before recommending designation.

Discussion Member Jacobi wanted clarification of potential Natural Area Partnership Program (NAPP) areas; Chair Bonar said that technically, yes, they fall under Commission review. Staff Yuen asked about the difference between a Subcommittee and Task Force. AG Chow explained that a Task Force does the investigatory preparation with the following process: 1) set up the process; generally three meetings; 2) report findings back to NARSC 3) take actions at following NARSC Meeting. This is very specific, as opposed to an on-going Sub Committee as set up by the NARSC. Member Jacobi felt that part of the role of the Task Force was to meet with other DOFAW entities, look at goals, not just NARS, but on-going rather than short-term. He also asked about the life of the Task Force. Chair Bonar asked if the Subcommittee sets up the Task Force or does the Commission set up a Task Force each time. AG Chow replied that the Subcommittee can do it, with 1 Commission member, not beyond Subcommittee (2 person rule). Chair Bonar asked if staff can be on a Subcommittee; AG Chow explained a Subcommittee is composed of NARSC Members; it is a NARSC function and they also need to follow sunshine law (2 or more). A Task Force may be set up by a Subcommittee, and may include staff and others, but it has to go through the three-meeting arc, so suggest using two or less members. Current Subcommittee Members are Bonar, Hughes, Jacobi, and Rowland.

Chair Bonar asked if a new Subcommittee needs to be formed or expand the existing Enhancement Subcommittee. AG Chow suggested redefining the Subcommittee. Chair Bonar said he could not be heavily involved and would step down and ask others to participate. Member Derrickson felt that expanding the existing Enhancement Subcommittee was a good way to go. Member S. Conant suggested more than two members but less than a quorum, and suggested asking Members not present at the meeting if they would be interested in serving.

Chair Bonar suggested new language for the previous motion.

MOTION: S. Conant/Yee moved to withdraw their former motion. Motion carried unanimously.

MOTION: S. Conant/Yee moved to modify the scope of the existing Enhancement Subcommittee to include items discussed regarding Conservation Management, review of potential NARS with an eye to recommend to the NARS Commission. Motion carried unanimously.

Chair Bonar recognized Staff Yuen as central staff person to work with the Subcommittee, other staff and entities. Member Yee suggested calling a meeting soon.

ITEM 5. Updates.

ITEM 5.a. Enhancement Report: Staff Yuen said that the NARSC has a huge role in this goal, to push for NARS or other designations. The workshop meeting at the end of June pulled together what participants want to see in NARS quality for Biological resources utilizing Dr. Price's input and proposal at that meeting, and to look at specific locations not just broad categories such as montane wet forest. Member Jacobi felt this was an on-going process that is tied to a similar process being done by the Hawai'i Conservation Alliance (HCA), called Effective Conservation which is a strategic planning process; important to link them together. Staff Yuen said that Paige Else was hired by HCA to coordinate that initiative with Staff Cannarella and the DOFAW Management Guidelines.

Lengthy discussion went back and forth on transparency, public disclosure, that all lists are tentative, that input is being sought from staff as well as interested members of the public.

Chair Bonar called for a 5 minute break at 10:15 a.m. for equipment set up; reconvened at 10:22 a.m.

ITEM 7. c. Management Plan and Cooperative Agreements: Staff Hadway gave an update on the proposed Cooperative Agreement with the Office of Mauna Kea Management (OMKM) for cooperative management in Mauna Kea Ice Age NAR. Since OMKM does not have regulatory authority, this would allow Mauna Kea Rangers, who are on-site every day in the Science Reserve, to assist NARS staff, when they notice any management issues in the NAR. The Mauna Kea Management Board also supports this more formal partnership. This does not mean that they are managing the Reserve for DOFAW, but are being recognized as the on-site presence.

Staff Hadway explained further that a Comprehensive Management Plan is being developed for the summit area (Science Reserve), but we are part of the pie, and part of the 2005 audit that also called for a Management Plan specifically for the NAR as well as a comprehensive plan for the Science Reserve. Meanwhile funding has been secured to proceed with cultural surveys in the NAR.

Chair Bonar asked if the Cooperative Agreement as written is alright but not a burden on staff or taking authority away from staff. Staff Mitchell said that it has not yet been sent to the AG; but it provides flexibility to make changes to terms; before it goes to the University, then to the BLNR for final approval; but recommended the NARSC support it and agree to allow medium changes. Chair Bonar then entertained a motion.

MOTION: JACOBI/DERRICKSON moved that the NARS Commission recommend the general terms set forth in the proposed Cooperative Agreement with the Office of Mauna Kea Management for Mauna Kea Ice Age NAR. Motion carried unanimously.

ITEM 7.e. Ka`ena Point Natural Area Reserve: Approval of draft Cooperative Agreement with The Wildlife Society and US Fish and Wildlife Service for the Ka`ena Point Ecosystem Restoration Project. Staff Mitchell summarized events that led to the proposed predator proof fence and implementation of the project. Again, she is asking for a similar recommendation for general terms to allow flexibility for changes following AG review. Chair Bonar asked Staff Liesemeyer if this was acceptable to O`ahu NARS staff; he replied that it was good in general but he and his staff have not worked out budget specifics and for long-term training, or for fence maintenance and for long-term funding for management as well. There is some concern that this is not an ideal location for such a demonstration project; the budget needs to be spelled out carefully.

Staff Mitchell replied that The Wildlife Society and Fish and Wildlife Service recognize this. Staff Liesemeyer was also concerned about the need to improve the road to support delivery of material and for construction. Chair Bonar then entertained a motion.

MOTION: Kawahara/Alaka`i moved that the NARS Commission approve and recommend Board the Cooperative Agreement based on general terms presented in this document. Motion carried unanimously.

ITEM 5.b. `Ahihi-Kina`u Update. Staff Evanson said that one week before closure there was an increase in visitors to the two remote coves for a “last look”; however the August 1 closure went smoothly, with Rangers handing out new closure brochures in the vicinity of the ‘Dumps’ parking lot, and counting approximately 1,000 visitors each day. Over 100 signs were installed along the roadway to inform about closed portions of the Reserve; there were a few visitors who claimed not to have seen any signs. On August 15, DOCARE began to cite incursions. With another Ranger hired there was more staff coverage. There were Advisory Group Meetings held on August 12 and September 9, 2008. The Group decided to reorganize and change considerably, including removal of the commercial activity seat at the table; also to review existing seat holders and to take nominations for Group membership.

Closure also included using yellow rope to delineate the cultural site of Maonakala, rather than a fence; no one has been observed in the area. Two more Rangers will be hired for a total of six. Staff Ramsey is working on standards for anchialine pool monitoring with Big Is NARS and National Park staff; NPS will also be helping with monitoring of the impacts to geological features and historic trails. The volunteer program is on hold; they want to jump back in; however staff need to better plan on how to involve them, develop better communications for the remote area (repeater is on order to remedy this), and work closely with them to insure that the correct information is being imparted.

Immediate future includes improving the parking lot, placing an office trailer on the right hand side of the parking lot, including accessibility compliance. The four Ocean Recreation Management Plan (ORMP) partners (Ha`ena, Ka`ena, `Ahihi-Kina`u, and Kealahakua Bay) are visiting each others’ projects to compare issues; `Ahihi-Kina`u was just visited by all the partners. Concerns were also expressed about aging vehicles, and

increasing staff and need for transport. Staff Evanson thanked Staff Ramsey and the Rangers for all the hard work and effort.

ITEM 5. c. O`ahu Natural Area Reserves: Staff Liesemeyer summarized the rodent monitoring as part of the Ka`ena Ecosystem Restoration project; starting with mongoose, now shifting to mice and rats, looking at home ranges. Preparation of environmental compliance documents is moving along; there was a site visit with the contractor, as well as cultural practitioners. The outreach group has done a great job of going out to the public. The challenge is to blend this project and the Reserve with the ORMP, which is largely on State Park lands; however State Parks does not have the resources to intensely manage, so DOFAW is helping where possible. Effort is underway to blend progress under Peter Young with the present with the formation of Friends of Ka`ena, a community-based group of folks to help support protection and management of the area.

Pahole NAR has on-going strategic fencing; staff continues to work with the Army, the greenhouse is progressing and staff is growing. This growth means a shortage of office space, so considering looking for additional space at Waimano. Have not had the opportunity to prepare an Operational Plan, but taking steps to work on one and doing staff integration.

Staff Takahama added outreach after the hunters were invited to hunt; this was developed by NARS staff on O`ahu Branch and then August 1 began a 7-day program for controlled hunting within a fenced area. This was a trial to head off displeasure of hunters and not to have them take it out on the fences (although there are still some minor impacts to fences).

Staff Liesemeyer expressed concern and losing temporary staff: it took so long to get them, they are finally getting up to speed, but the Legislature looks at them as unfilled so there is the chance they will be taken away; do not want to lose that support! Staff Takahama said that new staff member Christopher Miller is the key staff person for hunting. Staff is revisiting weed surveys at 3 to 5 year intervals; one big concern is *Ficus microcarpa*, it was picked up through monitoring. Member Jacobi thanked them for their updates.

ITEM 6. Natural Area Partnership Program Renewals for Kapunakea Preserve, West Maui and Pelekunu Preserve, Moloka`i. Staff Kennedy remarked that the two plans were being presented for information only, as part of the consultation process. He then introduced Mr. Chris Brosius, West Maui Mountains Watershed Partnership (WMMMWP) Coordinator; Mr. Mark White, TNC Maui; Ms. Kathy Tachibana, TNC Moloka`i, and Dr. Sam Gon, TNC Senior Cultural and Science Advisor.

Member Derrickson asked if the Department is accepting authority; AG Chow said yes, not the NARSC. Summaries were then given on management progress over the past NAPP contract period. Recent actions included hiring ProHunt from New Zealand to work with TNC staff on hunting strategies for remote areas.

Management actions include trail maintenance twice a year, weed monitoring and control; difficult on steep slopes; augmented with aerial surveys. Threat monitoring is conducted, along with ungulate activity monitoring and active outreach coordination with Moloka'i Invasive Species Committee. The ultimate goal is to build community support and awareness concerning the conservation of native resources and to employ effective conservation practices that are also culturally sensitive. Staff also continues to undergo fire and other safety training. There is now an East Moloka'i Watershed Partnership with Kalaupapa National Historical Park, Ranchers, TNC, and others.

Mr. Mark White, Director of TNC Maui summarized progress in Kapunakea Preserve with this fourth renewal of the long-range management plan. He expressed gratitude for Commission and State support. One of the other successful partnerships involves WMMWP (established in 1992); TNC Maui has contracted with WMMWP staff to do much of the management, which helps everyone, including the four sections of West Maui NAR (Kahakuloa, Honokowai, Panaewa, and Lihau), Forest Reserve, Pu'u Kukui Watershed Management Area (another NAPP participant); since what happens on one parcel has the potential to affect or benefit the others. Kapunakea has its own suite of rare plants and animals, including rare land snails. Transects are read at least one time per year (ungulate activity, weeds); weed control, rare snail monitoring (including monitoring for predators), on-going fence maintenance and management, and searches for rare plants.

Mr. Chris Brosius explained that although WMMWP also does landscape-wide management, fencing is the primary management activity of his crew on behalf of all the partners. The costs of fencing material keeps going up, so maintenance and future replacement costs will be a concern in coming years.

Chair Bonar asked when the Commission would see these for final approval. Staff Kennedy hoped they would be ready by the first meeting in the new year. Member Jacobi asked when ProHunt's report would be available. Stephanie Lu said that Dave Allen is wrapping up lessons learned for a report to the NARSC.

Chair Bonar thanked them for their presentations, called for a short break at 12:05, reconvening at 12:12 p.m. to consider remaining items.

ITEM 7.b. Manuka Natural Area Reserve, Hawai'i: Staff Hadway gave a brief update as a heads up that staff is in the initial process of revising the Management Plan to include more cultural elements and other concerns that would follow the Strategic Plan.

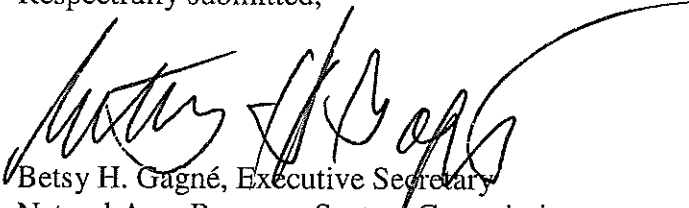
ITEM 7.d. National Park Service: Status of renewal of a Cooperative Agreement with the National Park Service for Pu'u Ali'i Natural Area Reserve, Moloka'i. Staff Mitchell gave a very brief heads up that the Park Service was in the very early stages of considering renewal of a Cooperative Agreement. Since the NAR actually falls within Kalaupapa National Historical Park, this authorized them to cooperatively manage the NAR with Park Service and Biological Resources Division staff, greatly facilitating on-going management.

Chair Bonar thanked NARS staff for their updates, and asked Staff Kennedy to mail out a budget update to members.

ITEM 8. Announcements. Staff Yuen said that Hono O Na Pali NAR Extension is on the way to be a NAR, the notification of next Subcommittee Meeting will be made as soon as possible. Chair Bonar wanted to place the tracking of marine invasive species, most specifically Roi and Taape in `Ahihi-Kina`u on the next agenda, having heard about special hunts for them elsewhere on Maui.

ITEM 9. Adjournment. Chair Bonar adjourned the meeting at 12:15 p.m.

Respectfully submitted,



Betsy H. Gagné, Executive Secretary
Natural Area Reserves System Commission

**MINUTES OF ENHANCEMENT SUBCOMMITTEE MEETING of the NATURAL
AREA RESERVES SYSTEM COMMISSION (NARSC) October 7, 2008, Honolulu.**

COMMISSIONERS PRESENT:

Dr. James Jacobi
Dr. R. Flint Hughes
Ms. Rebecca Alakai
Mr. Trae Menard (via phone)
Mr. Scott Derrickson, for Director, Office of Planning

STAFF:

Mr. Randy Kennedy, DOFAW
Ms. Betsy Gagné, DOFAW
Ms. Emma Yuen, DOFAW
Dr. Scott Fretz, DOFAW
Dr. David Leonard, DOFAW
Mr. Michael Constantinides, DOFAW
Mr. Alvin Kyono, DOFAW
Mr. Roger Imoto, DOFAW
Ms. Lisa Hadway, DOFAW
Mr. Bill Evanson, DOFAW
Mr. Bryon Stevens, DOFAW
Mr. Matt Ramsey, DOFAW
Mr. Brent Liesemeyer, DOFAW
Dr. Dan Polhemus, Division of Aquatic Resources (DAR)
Mr. Glenn Higashi, DAR

OTHERS:

Dr. Jonathan Price, University of Hawai'i Hilo
Ms. Page Else, Hawai'i Conservation Alliance (HCA)
Ms. Stephanie Lu, The Nature Conservancy
Ms. Deanna Spooner, HCA

ITEM 1. Staff Yuen, as Enhancement Coordinator, called the subcommittee meeting together at 9:15 a.m., followed by introduction of members and others present. Staff Yuen then gave an overview of the agenda and goals of the meeting.

ITEM 2. Staff Yuen gave a Power Point presentation on the Process for NARS Nomination and Modification. This included the 10-step process approved by the Board of Land and Natural Resources earlier this year which contains a clarification for when DOFAW is asked to comment on individual nominations. Staff Yuen showed how the Hanawi West Extension was at step #1, while the Poamoho and Kanaio Mauka NAR nominations were at step #8. The Hono O Na Pali Extension NAR nomination was at step #9. All other proposals or ideas for Reserves were not yet part of the process because no formal nomination had been prepared. They were in a pre-process stage. The presentation continued with a justification for the Enhancement Report, to

systematically identify areas for their biological resources in order to prioritize existing NAR proposals as well as identify other areas for conservation management. The role of the NARS Commission Enhancement Subcommittee was explained as having the responsibility of defining the criteria for evaluating nominations, compiling information to identify areas to have nominations prepared for full NARS Commission review, as well as identify other ways to preserve natural resources. Additionally, the Subcommittee on Enhancement has the responsibility to meet with land owners and land managers whose areas are identified as biologically important to discuss opportunities for conservation management and designation.

The presentation continued with an overview of the data for the Enhancement Report. Data was discussed in earlier Subcommittee on Enhancement meetings and identified for evaluating these areas. In order to find specific areas that were the most “relatively unmodified” examples of ecosystems that had gaps in the NARS, a multi-stage radial survey method was used to ask experts about their recommendations for biologically important areas as well as for data and who else to speak to.

At approximately 9:45a.m., Member Menard was contacted via telephone and put on speaker to join the meeting from Kauaʻi.

Data contained three sections: Flora, Fauna, and Landscape. Dr. Price summarized the “Total Plant Richness” layer, projecting the GIS layer on the wall. Dr. Price said that this layer was created by taking the predicted plant species ranges of all native plants and overlapping them to create a richness layer. Member Jacobi clarified that this did not include ferns. Northwest Kauaʻi was used as an example of very high plant richness, due largely to the older age of the island. Dr. Price explained that the Puna side of the Big Island was relatively poor in plant species richness because of the younger age of the island. Dr. Price gave a habitat model of *Alectryon* on Kauaʻi, with moisture zones influencing projected habitat.

Dr. Price explained the Habitat Quality (part of the “Landscape” section) and said that it can paint a rosier picture about the quality of the habitat. This layer was based on Hawaiʻi GAP Analysis (HI-GAP), and is depicted by green areas being predominately native, yellow areas being alien-dominated areas, and red areas being completely converted areas such as urban and agricultural areas. Dr. Price mentioned that Kalalau had some species, a very small group, that did not have their ranges modeled because they were only known from one area; Koaʻie also had some of the rarest of the rare. Staff Kyono requested that the map layers be sent to him.

Dr. Price gave an example of Mauna Loa Mosaic, where the western part was mostly lava fields with low potential diversity while the lowlands had more diversity, especially in many of the kipuka. Staff Yuen explained that Flora and Fauna categories were designed to pick up the highest examples of richness within the entire identified areas. Member Hughes asked whether diversity had habitat quality taken into account. Dr. Price answered that he was running a model right now which will enable him to have specific list of all the plant species that can be predicted within a given boundary and whether their range falls within a native or alien dominated portion

of the area to determine their likelihood of actually being found in that area. Mauna Loa mosaic had low diversity but high habitat quality, and was native dominated, compared to Kalalau, which has high species diversity but is hammered by weeds.

Member Menard asked whether the habitat quality layer was a good proxy for determining whether a given species would actually be found in a particular area. Dr. Price said there was a strong correlation of lots of plants in high habitat quality areas, except for *Abutilon menziesii*. This new model would trace the likelihood of the plant species being found in that area. Also very helpful to have on-the-ground expert reconnaissance.

Dr. Price described the “Endangered Plant Richness” category which is a subset of the “Total Plant Richness” category which only includes endangered species. For instance, Kalalau cliffs contain many endangered species, and Oahu mesic lowlands also contain very high endangered plant richness, compared to Ka`ala, which is less disturbed.

Staff Yuen introduced the “Fauna” section, which mapped species ranges for forest birds, using HI-GAP species ranges. Dr. Price said that there was more precision with this because the birds’ ranges could individually be counted. Staff Fretz asked whether predictive models could be used for montane seabirds. Dr. Price answered that work is underway on Kaua`i to do that.

Staff Yuen introduced the “Aquatic Fauna” category which used information from the *Atlas of Hawaiian Watersheds and their Aquatic Resources*. This Atlas contained ratings for various factors of over 400 watersheds, and one of those was a 1-10 rating for native species, based on the amount of native aquatic fish and macro invertebrate species surveyed in the stream. Staff Polhemus explained that the Atlas was meant to contain GIS shape files for streams, except ones that were extremely infrequent, such as in Ka`u. Not all streams were surveyed, for instance some streams in Hamakua have not yet been surveyed. The Atlas compiles stream data and distinguishes certified survey information from DAR staff and other types of information sources. It also gives an objective rating to total species and invasive species, looking at fishes and macro invertebrates. However, many are only found in the upper reaches of streams, for instance streams that dry out at the end. Staff Polhemus mentioned that in many cases a stream was the only place in a given landscape which was still biologically intact, even in areas where the land cover was totally converted, for instance, in Moloa`a. Staff Polhemus said that the analysis that Dr. Price did with species richness was good, although ecologically chauvinistic, and that perhaps the Subcommittee should be aware of unique marine resources.

There is one Reserve with a marine component, `Ahihi-Kina`u, and there are Marine Life Conservation Districts, but no representation of deep reef ecosystems with black corals; although these have been mapped, especially in Maui. Another area to look at is Lua O Palahemo (Big Island), which is a geological feature with endemic decapods. There is more terrestrial conservation information, and a general trend is to focus on the terrestrial, and then the aquatic, and then marine with conservation and the gathering of information. Following next are models for predictive ranges of aquatic species, referring to the Atlas of Hawaiian Aquatic Species.

Staff Yuen introduced the anchialine pool species rating, which presented under-development data that was gathered by Stephanie Lu at The Nature Conservancy as part of their Ecoregional Plan. Anchialine pools were given a species rating based on the species' rarity. Ms. Lu mentioned that it was a draft rating system and that comments and input were welcome.

The "Landscape" section was summarized by Staff Yuen as different from the "Flora" and "Fauna" Sections, because it looks at the overall condition of the biologically important area identified instead of picking up on the hotspots of species richness. The habitat section was based on 9 habitats distinguished by bioclimactic and substrate factors; for instance, Waihaka had 5 habitat types. Priority habitats were habitats identified by the Hawai'i Conservation Alliance as having the least conservation protection and highest amount of degradation. Priority habitats were Lowland Wet, Lowland Mesic, and Lowland Dry. Habitat contiguity used the same data as the habitat quality section to see whether the surrounding habitat was also high quality or it was more of an island surrounded by alien-dominated habitat.

Management contiguity was the next category which used HI-GAP's measurement of land stewardship to determine Management Intent Status. The management intent status was meant as another viability measure because theoretically areas that were nearby areas managed for conservation would be more viable in the future. Both neighbors could partner and share management advice.

The next category was Ecosystems, which was based on the 10 ecosystems distinguished by The Nature Conservancy's Ecoregional Plan, and the 15 geographic units, as well as the viability of that ecosystem in the regional unit. This showed the percent of ecosystems in the NAR and a slide that showed whether the NARS captured the most viable ecosystems. Also, looked at where there is good viability and unrepresented ecosystems but no NAR representation.

At 10:35am the Subcommittee took a 10 minute break, and reconvened at 10:45am.

ITEM 2b. Discussion of items listed in the "Next Steps" section of the report regarding a definition of "Representativeness" as well as "Relatively Unmodified," and how to address the limitations and omissions in the reports' data. Staff Yuen gave a PowerPoint presentation on some of the omissions and limitations of the data, identifying marine, geological, terrestrial invertebrate, seabird and waterbird, and dryland and coastal resources. Staff Yuen said she could not find any comprehensive sources of data for some of these resources, but suggested using other surrogates such as waterbird information from the U.S. Fish and Wildlife Service's Draft Recovery Plan for waterbirds, which had information on core wetland habitats. Staff Yuen noted that point data, rather than ranges, perhaps should be used to assess whether certain areas were important habitats because waterbirds need very specific type of habitats. Additionally, data only available for certain sites could be added when more information is pursued for certain areas that are higher priorities based on input from this meeting; an example was given for the 2008 seabird surveys on Kaua'i.

Member Jacobi discussed the size of ecosystems and areas needed for the preservation of these ecosystems, since some ecosystems are inherently smaller than others, so perhaps a percentage should be used, rather than size by itself. Dr. Price added that size needs are different for different types of ecosystems, such as a dryland ecosystem might not need to be very big, and large expanses might be more difficult from a management perspective. An ecosystem with forest birds might be a different story.

Staff Yuen mentioned that the Enhancement Report gave a 10% of representativeness threshold, and asked whether that number was something that they wanted to change. Staff Stevens asked whether that number was 10% of the remaining ecosystem or 10% of the original extent. Staff Yuen answered that it was the remaining ecosystem. Staff Stevens pointed out that for dryland forest, there is only 5% left, so perhaps there would need to be more than 10% of that remaining forest left. As far as ecosystems where the vast majority of the area is still present, 10% might be enough. Member Jacobi said that the 10% was a grab number that was arbitrary, and should be used as a check off to be done, and that there are other things that should be considered. Also, the NARS is not looking for the best, most intact areas. It is not just the most pristine areas that we want, but also areas that are not represented and degraded may need reconstruction and restoration. These areas might not be very pristine, and may not be found otherwise. Dr. Price offered the idea of having some kind of alternative minimum where it is possible, but a higher minimum threshold of actual acreage. Staff Evanson said a relative proportion would be good.

Staff Yuen mentioned that in the Report, the bolded areas have the high viability ecosystems. One way to change the report is to take into account the minimum thresholds for acreages? Staff Yuen asked what that minimum acreage threshold would be, and whether there is bird or plant habitat. Member Jacobi said that it depends on what the target is, for instance whether it was a bog, it would need a much smaller area. It begs the question of how small an area one should recommend, or how large is too large and not necessary. Staff Stevens said that there was a paper by Jim Juvik done that showed what percent of each elevation zone was in conservation district. It would be interesting to see what percentage is protected now, and what is left. Dr. Price said there could be two discrete numbers: the percentage left which is protected, and the percentage that was originally there that is protected. Lowland wet and lowland dry were extremely extensive, even more extensive than montane, but there is little of that left now.

Staff Yuen said that the report did more of a simple analysis that stated whether it was less or more than 10% to determine the really underrepresented areas. Hopefully in the future we can take into consideration different factors. It would be a good exercise to note ecosystems that have very small extents now. Staff Yuen asked how we can use information we have now to determine what the biologically important areas are, or should we change the charts. How can we work with what we have to accomplish what we have come here to do, which was to identify areas to pursue for more information, as well as to hold have meetings with land managers.

Staff Ramsey asked about the coastal ecosystems, or geological information and whether they

were out of the question because they were not on the list. Staff Yuen said that it is not possible to put that together now, and that was the original reason why they were left off in the report because they have not been measured in a statewide or comprehensive way. One way to make up for those limitations would be to go back to individual areas and make sure that geological, nonvascular plant, terrestrial invertebrate, information would be gathered. Member Jacobi said it could be looked at in another way, that this suggestion list is one from people on the ground. Where there is one way to measure certain information, such as the plant richness list from Dr. Price, when that information is applicable, that will be used and when that is not applicable or does not give the complete story, areas won't be taken off the list, but instead new information would be needed to assess areas. We have one scalar to evaluate plant communities, and if there are wetland resources for instance we would need to come up with another way to evaluate, but they won't be taken off the list.

Staff Yuen said that in the next section of the agenda is to acknowledge the omissions in the data, such as coastal areas, which are "pink" all down the line, and instead of throwing them out, we should acknowledge that perhaps these areas should be prioritized despite lack of information.

ITEM 2c. Discussion of results from report: Which areas should have more information gathered about their resources and be pursued for conservation management based on the preliminary evaluation of biological resource value.

Staff Yuen mentioned that the first step would be to determine how many areas we would like to start out with. She posed the question of how many areas should make the first cut and be pursued for more information and meetings with land managers. Member Jacobi said that an area not initially picked would not be left out forever, or even for a long time, and this would be a test of the process. Staff Yuen addressed the Branch and NARS managers about how many areas would work. Staff Evanson said suggested choosing at least one, to test it out, especially because you see how slowly this process has gone. Staff Kennedy mentioned that the slowness of the process was a function of the lack of capacity, and now that there is capacity, there is not an infinite amount of capacity, but much more. Staff Evanson asked Staff Yuen how many she could handle. Staff Yuen said that it was important to note that the analysis only looks at two of the criteria for NARS, and we would want more than one, in order to diversify the portfolio. She said she would be willing to put together information together and schedule meetings for whichever areas are recommended.

Staff Kennedy said the purpose of getting this information could also be used for grant proposals and also could be used for conservation of Forest Reserves. Member Derrickson concurred that this is not necessarily to take land from Forest Reserves. Staff Imoto said it was. Member Derrickson discussed the resource value, and how conservation may be achieved, and that NARS may not be the best option for conservation management.

Staff Yuen said the next step is to have meetings with branch managers and talk about biological importance as well as size. Staff Kyono said that it was essential to get the buy-in from the branch. The first step is meeting with the district people. Member Jacobi said that here, we are

coming up with a way to identify areas, maybe to be nominated for NAR, and many not. This links directly to DOFAW's Management Guidelines, this information is very pertinent to that process, could overlap and serve as a starting point, and could be used for various uses. Today we are identifying biologically important areas rather than focusing on a NAR process in particular. These biologically important areas were developed this from a broader perspective, and only more powerful if used across the board for many uses.

Staff Yuen mentioned the statutory power of the NARS Commission to advise the Department and Governor about the preservation of natural resources in general. Member Jacobi said that this is one assessment for the suggested area; a quick short-circuited process, perhaps not more than 20 in this list with somewhere between 10 and 15; but ones we say could be important for NAR or NAPP or forestry, or are simply important. If we can walk out with tentative check marks, that would be great. We need the Branch Managers to help in communicating to their staff that this is not a list of NARS, but of simply an identification of Biologically Important Areas.

Staff Kyono asked how Critical Habitat would be taken into account. Member Jacobi said he would rather have that discussion with Fish and Wildlife in the room.

Staff Imoto asked about money to manage these areas, in a time of budget cuts, and how NARS does not have the money to manage all their areas now. Member Jacobi said that that is true, but that is true for Forest Reserves too.

Staff Yuen said that there is not time to talk about management for each of the particular areas in this meeting. As far as management in general, the first step is identification or designation of the biological importance of an area. You cannot write a grant without knowing the importance of an area. If management capability equaled designation, there would be no NARS in the first place, because for a couple decades there were no crews or funding for management of the NARS. This is taking a long-term approach and starting with identification.

Member Jacobi said that these might help identify the most important areas for conservation, which could be included in the Management Guidelines. Maybe ultimately this whole list will be "upgraded" for conservation, and others will be added; the 90 day process where DOFAW is consulted about the nominations for NARS is the very minimum, and discussion will actually start much earlier about management of these areas.

Dr. Price said that this can be looked at as a focus list. Some of these areas are strong one way, and others have strong points in different ways biologically. The end list should be very diverse. It would be also interesting to look at the challenges and issues, such as political, or management feasibility challenges. If there are two areas that are biologically similar, it is important to note the usage of that area, for instance hunting.

Member Menard said that from a management perspective, it is important to ask how much of an investment it is going to take to manage an area, and how expensive it will be and eat into our

budget to manage other areas. Look at it in a larger scale with all the areas that need to be managed and see whether you can both manage that area as well as the other areas that need it. Of course, the first filter is looking at the biological importance.

Staff Stevens said that the point of these meetings is to find the unrepresented ecosystems; we should find the glaring holes in the ecosystems, instead of trying to save the entire world and should prioritize those holes. We glossed over agenda item 2c, representativeness; we do not want to be bogged down in political considerations, and the like.

Staff Yuen mentioned Appendix 3 of the report, and said there are many ways to display ecosystem gaps, but the way chosen in the report is to see areas that have less than 10% of their extent represented in NARS or Management Intent Status 1 or 2 areas. The other Appendix has a list of natural communities not found in NARS, Refuges, National Parks, or such; however, this list is problematic because there is not spatial representation of the natural communities for all the areas, and the data is a little old, as it was chosen to use a broader type of ecosystem classification. A spatial representation is in the HI-GAP Appendix, which shows natural communities with less than 10% of their extent in Management Intent Status 1 or 2.

This broader chart shows little representation in the Ko`olau Mountain Range, for instance, or Kaho`olawe. Perhaps we could talk about how this could be used; it is something we hinted out earlier with our discussion of the extent of the acreages and the size. Staff Hadway asked whether the chart takes into account the other designations that could potentially make up for those gaps. Staff Yuen said that Appendix 5 lists ecosystems with more than 10% of their extent in a Management Intent Status 1 or 2 areas, List C has that data. Member Derrickson said it would be helpful to marry the missing ecosystems and whether the listed biologically important areas would fulfill that gap. Staff Yuen mentioned that the charts with the ecosystem section has that table, with pink areas as having more than 10% of their ecosystem extent in a NAR, the yellow areas being ones with less than 10% extent in a NAR but more than 10% in a Management Intent Status 1 or 2, and the green areas having less than 10% in less than any Management Intent Status 1 or 2. Staff Stevens noted that Maui Nui is taken care of, except for Lana`i.

At 11:30 p.m. Member Menard excused himself from the meeting, and ended the phone call.

Member Jacobi said that there are two ways to look at the areas: total richness, and another way to look at the ecosystems for holes. He cautioned against looking at only the quality, since some ecosystems just do not have a good quality examples. Staff Kyono also mentioned that manageability is another big concern. Dr. Price said that manageability is implied in some of these areas, for instance the size and habitat quality. Staff Stevens said that manageability would be the discussion with the Branches. Member Jacobi agreed that that was the 2nd tier of the discussion.

Staff Liesemeyer said that discussion was held with regard to Poamoho, about what kind of on the ground changes would happen if it was a NAR rather than a Forest Reserve, and whether

there would be any changes in management if a NAR was designated. Member Jacobi said this is part of a larger DOFAW Management Guidelines process, which may elevate conservation management in any kind of area. Member Hughes asked Staff Liesemeyer what the answer was in the Poamoho situation. Staff Liesemeyer said that it is a function of funding and capacity. In the past, NARS could do more; now there is a O`ahu Protection Forester in DOFAW to help with management in Forest Reserves.

Staff Yuen said that we are jumping ahead of ourselves talking with management and instead should focus on the representativeness questions. Please be prepared after lunch to talk about specific areas we would like to select for future management discussion. Dr. Price suggested that during lunch people could write down which 10 areas that should be selected.

Lunch break was called at 12:15pm. Meeting reconvened at 1:00pm.

Staff Yuen introduced the agenda item 2c and began a discussion of the island of O`ahu. Staff Liesemeyer said that the Kaluanui proposal was good because it contained many unrepresented ecosystems, and that Poamoho and Manana were similar, but mentioned the snail population on Poamoho. Because Poamoho was nearer to Kaluanui, he preferred Poamoho. Member Jacobi asked whether there was a benefit to the boundary of Manana being lower, Staff Liesemeyer responded that the Poamoho boundary was based partially on where hunters go, and that there were some snails found lower than that boundary.

Staff Kennedy said that another option for O`ahu was if the Turtle Bay property was purchased by the state, some really nice coastal areas could be possibly be looked into. Staff Yuen asked if there were any more comments about O`ahu, then turned the discussion to Kaua`i, which has many ecosystems unrepresented in the NARS, or any other type of Management Intent Status 1 or 2 areas: Ku`ia North, Kalalau Back, Hanakoa Cliffs, Upper Koa`ie Canyon, Hono O Na Pali Extension, Namolokama Mountain, Blue Hole. General locations were described and projected, followed by habitat quality, total diversity, and endangered diversity layers.

Staff Kyono mentioned that Namolokama and Kalalau (back wall) were biologically rich. Member Jacobi asked whether the Alaka`i Wilderness Preserve was not identified as biologically rich. Staff Kyono answered that it already was protected, and that it historically has been managed as a NAR although it was not a NAR.

Staff Yuen pointed out that the Ku`ia North represented ecosystems not in any Management Intent Status 1 or 2 areas. Staff Kyono mentioned that thinking ahead about that area, there would be problems, and Member Hughes asked what those problems might be. Staff Kyono mentioned that there is a lot of human use.

Member Jacobi discussed the Upper Koa`ie Canyon, and how there is not any NAR wet forest representation; Dr. Price said he was thinking the opposite, how there is not any really dry areas, and the Upper Koa`ie canyon also encompasses those ecosystems as well. Staff Kennedy

mentioned that this is the first crack at finding biologically important areas, and how Staff Yuen has established a network to get more information on these places.

Member Jacobi asked Staff Kyono whether there were other areas when there were other areas, especially looking at the DOFAW Management Guidelines that are especially important for biodiversity. Staff Kyono said that the Wilderness Preserve was an especially important area, the entire boundary and not a subset of the area; he also described the location of the fence in the Alaka'i, being proposed by Kaua'i Watershed Alliance.

Staff Yuen asked about highest priorities for filling ecological gaps of protection, then shifted discussion away from Kaua'i because Member Menard was not able to be re-contacted.

Staff Liesemeyer asked whether the HI GAP analysis included only state-owned areas, or all areas. Member Jacobi answered that it was all areas in Hawai'i. Staff Yuen brought up the topic of the Big Island, since representative staff from the Big Island were present at the meeting. Staff Imoto mentioned Tract 22 as being biologically important. Staff Yuen asked why; Staff Imoto explained that the surrounding management contiguity was high.

Staff Yuen started discussing the areas identified as biologically important: Kohala Coast and Mauna Kea North Slope. Staff Hadway said that there was an 11,000 acre area that is in a long-term lease as a Science Reserve. Staff Yuen said that the area was nominated as geologically important, which was not covered in the Enhancement Report. Mauna Kea Ice Age Extension and Pohakuloa Extension were also identified as biologically important.

Staff Imoto asked why such a large amount of area was needed to be identified, since only a representative is needed. Staff Yuen mentioned that it is important to discuss the size of areas, and how this particular boundary encompasses all the alpine and most of the subalpine area. Staff Hadway said that the Pohakuloa Gulch was a good suggestion. Staff Imoto said it should probably extend to the new road, not the old saddle road. Staff Yuen asked what the justification of the area was. Staff Imoto said the critical habitat and endangered species, silver swords, and cultural areas.

Staff Yuen also showed the Mauna Loa Mosaic, Kulani, Tract 22, Malama Ki, Kaniahiku, Nanawale, and Waihaka areas. Staff Imoto said that Waihaka ecosystems were represented in the National Park. Staff Yuen said yes, that had to be taken into account, although the Montane Wet ecosystems in Ka'u were not represented. Ka'u was also an idea: the entire Forest Reserve. Staff Imoto said that portions of it could be considered as important biologically. Kamilo and Lua Palahemo were discussed. Member Jacobi clarified that nothing on the Kona side was mentioned.

Member Hughes said that there were three sections of the Nanawale Forest Reserve. Member Jacobi said it was a placeholder for lowland wet. Staff Hadway said that Tract 22 was lowland wet, since it was below 3,000 feet elevation. Member Jacobi said it was pretty different forest in

Tract 22. Staff Imoto said it would be good to get Tract 22 in some kind of designation; right now it is just hanging out there.

Staff Yuen asked which ecosystems are not represented to see what areas could fill those gaps. Staff Kyono said it would be helpful to know, if any particular area was designated, then how much percentage of the area would be protected. Member Jacobi suggested having an account sheet, which would show how the percentages of these ecosystems would be protected. Staff Hadway asked about the distinction of the Kona and Ka`u districts, and how the definition of these layers is very important since Manuka NAR is on the boundary of these areas.

At 1:45 p.m. Member Menard re-joined the meeting via phone.

Member Jacobi said that this process will help the management guidelines by getting more information. Staff Imoto said that the Waiea area near the South Kona Refuge should also be recognized, and it is unencumbered state land; also, the dry cliffs above Pebble Beach are also important and unencumbered state land, and looked at as a possible additions to the Forest Reserve. Dr. Price said that south of the area was the biggest pili grassland he had ever seen. Staff Imoto said that there was even a house on that area that could be used for management. Staff Yuen pointed out that there was not even a dry cliff category in Kona identified in The Nature Conservancy's Ecoregional Plan; Dr. Price said that was a limitation in that they only identified larger ecosystems. Staff Yuen said she could try to gather similar ecological data for these new areas, and thanked Staff Imoto for the suggestions; Member Jacobi agreed.

Staff Yuen mentioned that there was little representation in Pohakuloa-Pu`u wa`awa`a, and Ka`u Kapapala has unrepresented ecosystems of Montane Wet ecosystems, and Montane Dry and Mesic in Windward Mauna Loa. Staff Hadway said that the key biological areas are not the subalpine and alpine areas, and the proposal should be culled back several tens of thousands of acres. Member Jacobi said that the mesic and dry areas are key areas for birds, especially with the kipuka intermix. Dr. Price said that it is one of the more likely places for a Mauna Loa volcanic flow. Staff Yuen clarified that the Montane Dry and Mesic areas of Windward Mauna Loa were unrepresented. Staff Imoto mentioned the Kamehameha Schools property also has a lot of management going on, with the Watershed Partnership.

Member Jacobi said that it is important to look at the whole Ka`u area, and the entire area is a biologically important area. Staff Imoto also brought up the idea that the Hamakua area south of Hakalau Forest and Wildlife Refuge had bogs and was biologically important, and contiguous with other management entities. Member Jacobi said that the coast areas are also interesting. Dr. Price brought up the lowland mesic areas directly north of Pu`u O `Umi NAR, and is probably better than similar ecosystems in Muliwai. Staff Hadway mentioned the unit above the NAR that is designated as a management unit of the Kohala Watershed Partnership. Higher quality areas occur as you move northwest of the NAR. Member Jacobi said that a strip from the coast to the lowland mesic areas may be especially important.

Staff Evanson brought up Waimanu as unrepresented; Member Jacobi said that wetland and waterbirds are not represented in these biologically important areas. Staff Hadway said it was great pig habitat.

Ms. Lu mentioned Kamilo as biologically important. Staff Yuen said the list for Big Island: Tract 22, Pohakuloa Gulch, Montane Wet and Lowland Wet areas in Kau, Waiea, Dry Cliff above Pebble Beach, Montane Mesic and Montane Dry areas in Mauna Loa Mosaic, Waimanu for wetland resources, Koa Timber areas by Hakalau Refuge based on bog vegetation, and Kamilo, and Malama Ki.

Discussion went back to biologically important areas on Kaua'i. Member Jacobi said that this process is broader, more than just where new NARs will be, but for the management guidelines, or especially important areas in Forest Reserves. Member Menard said that Ku'ia North was a good representation of Lowland Mesic, encompassing Awa'awapuhi and Honopu drainages. Upper Honopu drainage up to Kalalau area is one of the most defensible areas of mesic forest, in really good shape. From a management standpoint, the terrain lends itself to fencing. Dr. Price said that area is a hotbed of rare plant points. Member Menard said that Ken Wood gave him polygons of Kalalau of 40-60 acres of best remaining patches right there.

Staff Kyono asked whether the boundaries of Namolokama would include the lowland reaches; he also mentioned half of the plateau is Kamehameha Schools land. Staff Yuen asked how lowland wet areas can be represented, since they are not protected in any MIS 1 or 2 areas. Dr. Price said that the lowland wet depicted in the habitat quality layer is a bit rosier than actual on-the-ground areas. Staff Kyono said that Lowland Wet areas below Namolokama are quite degraded. Staff Yuen asked whether there is another Lowland Wet area; Staff Kyono said that Blue Hole, below Waialeale is important. Member Jacobi said that cloud forest is important. Member Menard said that Blue Hole is in great shape. Staff Kyono said that the other lowland area to be discussed is Koa'ie, and is in critical habitat. Member Jacobi said that Critical Habitat is not necessarily something that leads to active management.'

Member Jacobi said that there had been a discussion of Kure Atoll, since that is part of O'ahu; Staff Kyono said perhaps we should be looking at Lehua island as well.

Staff Yuen started the discussion of Moloka'i: Upper Kawela, Wailau Back wall, Oloku'i Coast, Kamakou, 'Ilio Point. Member Jacobi noted the important wet coastal resources around Oloku'i coast, which is rare. Dr. Price said that there are many rare plants along the south slope of Molokai. Staff Stevens said that perhaps a strip encompassing the lowland wet areas would be helpful. Ms. Lu suggested that 'Ilio Point was especially important for coastal vegetation. Dr. Price noted geological interest in 'Ilio. Staff Evanson said that 'Ilio Point deserves a higher level of protection.

Staff Yuen mentioned Lana'ihale, and how it had many ecosystems not represented in any Management Intent Status 1 or 2 areas. Staff Hadway mentioned the NAPP and how TNC might

be withdrawing from participation. Ms. Lu explained the NAPP situation is being reanalyzed as part of TNC's strategy. Member Jacobi said that particular NAPP needs to be analyzed for active management. Member Derrickson said that Lana`ihale will have a lot of discussion, especially because of the wind power and discussing tradeoffs. Staff Kennedy said that it deserves to be on the list, and the Fish and Wildlife Service has a conservation easement for that area. DOFAW has a big involvement in that area. Staff Hadway mentioned the possibility of listing snails. Member Jacobi said Lana`ihale would need to be on the list.

Staff Yuen brought up Maui: Kauaula, Puehuhunui, Keawalua to Waihe`e, Kahikinui, Hanawi West, Waiho`i Crater Bog, Kanaio Coast, Kanaio Mauka, and Kanaio Makai. West Maui had a lot of representation in the NARS. Puehuhunui and Kauaula was based on rare plants, but since these ecosystems are pretty well-represented, it would be interesting to see where these go, said Staff Stevens. Ms. Lu said that input from The Nature Conservancy was that it was biologically important.

Staff Stevens said that there should be an overall evaluation of the north slope of Haleakala, and what is the best part, and not to add one piece here or there. The Bogs piece should be part of a NAR as another natural community; a lot of the lower elevation areas are a lot lower quality, and ask what purpose of the NAR is supposed to serve. Po`ouli may have been the reason why that cookie cutter portion of Hanawi was taken out. There is a management plan for the East Maui Watershed Partnership. Staff Evanson said that taking the entire area down to the road might be good because of the stream, Dan Polhemus had shown in stream surveys that it is an amazing stream; the geological features are also important.

Staff Stevens said that there is dry forest in the Kahikinui area, and that areas to the West of the state land is the best Koa forest, in DHHL land. Dr. Price said that the Kanaio area had connectivity with lowland areas and coastal is important, and there are pockets of native, open, shrubby lava vegetation and wiliwili areas. Staff Evanson said that there are Kanaio Homesteads. Staff Stevens said the area is important biologically as well as archeologically, although not a good idea as a NAR. Member Jacobi said we should look at the area, and figure out where the most important areas are within that large TMK.

ITEM 2d. Discussion on the process for involving land managers and owners in areas that have been identified as important biological areas by the NARS Enhancement Report.

Meeting attendees took a 10 minute break at 3:00pm and reconvened the meeting at 3:10pm.

Member Jacobi stressed the need to discuss the management of these areas with the districts, and how it is important to have the branches to be able to comment on these areas. However, one part of this is definitely to make an area a NAR too. Staff Kyono said that the first meeting should be within DLNR division such as DOFAW and State Parks, and then discuss with other partners and watershed partnerships, agencies, and such.

Staff Yuen asked whether the agenda for those meetings would be the conservation management issue and biological issues. Staff Kyono reminded that management issues and long-term vision for the area should be discussed. DOFAW discussion should be first, then Watershed Partnership and others, and then public. Staff Evanson said that DLNR should be first, but important to make it as inclusive as possible, and have the Watershed Partnerships and agencies meeting before the public.

Staff Yuen asked what the pro and cons of this succession of meetings. Staff Kyono said it would cut a lot of work to start with the branch. Staff Constantinides clarified that a DOFAW meeting would have to happen first, and then asked about the public informational meeting. Staff Yuen said that if there is concurrence to pursue a NAR designation, it would start the NAR process. If there was another mechanism that would preserve the area, it would go on its own process, which would be discussed in the subsequent meetings.

Member Jacobi said it is important to realize that right now economic times are tight, but there is long term value to designate areas and identify areas even though there is not enough resources to manage areas right now. It is important to think ahead, and stop other types of land uses that might preclude that area from remaining native.

Staff Evanson said that it is important that seabird and other types of information is compiled to do this analysis. Member Jacobi said that it is not feasible to go over 200 areas and get all their biological information compiled before starting action on areas – whether the nomination is a NAR or some other type of conservation designation. Staff Evanson said that information is needed to make a decision.

Staff Yuen said that she could send around a shape file of biologically important areas to DOFAW, and Commissioners of the Subcommittee will meet with DOFAW and DLNR staff and then meetings to include other partners and agencies, and then possibly a public information session, especially if the conservation mechanism is a NAR.

ITEM 2e. Discussion on the proposed White Paper on NARS management. Member Jacobi said this was going to be a product of brainstorming amongst ourselves; the process today is similar to DOFAW's Management Guidelines and TNC's Ecoregional Planning, and Effective Conservation with HCA. DOFAW's Management Guidelines have three main mandates, one of which is for conservation. NARS is one way to specifically manage an area for conservation; that leads to how to manage the area as a NAR, and basically it means to manage for the positive values like ecosystem structure and species diversity. These are measurable in some ways, primarily plant communities, in species diversity and modeling of plants and birds. How do you manage threats? Getting invasive species and the degrading factors out. From the standpoint of the NARS, no ungulates is a goal, and major invasive species are either controlled or eliminated. Controlled to a threshold level and that is a little flaky because that level is unknown. Also, selected portions are have small predatory mammals in control. That is the way he is looking at developing the white paper, and what is the measurable pieces. Other pieces out there are snails

or damselflies, although that information is not comprehensive. Should link management actions to measurable items, and management for conservation as the primary goal. Also invited is help and input. Member Menard said that he could help, and he sees it the same way. The white paper should stipulate that on each area identified, there are specific management action aimed at these particular threats. There should be some kind of standard that says there should be a plan to address these threats, and tracking that. Member Jacobi said that this would be helpful for forest reserves and planning management for areas for conservation areas. Staff Constantinides said that this was the way to go, and management units in NARS should also have these goals. Member Jacobi said it would be around 2-3 pages and he would circulate this around.

ITEM 3. Next steps; setting other meetings, timelines. Staff Yuen said that the next steps have been discussed, and she will be gathering biological information, and schedule meetings with DOFAW, hopefully within a couple months. Member Derrickson asked if a list would be sent out to the districts. Staff Yuen said yes. Staff Kyono said that in December they started shutting down. Staff Evanson said it would be better to discuss after the new year. Member Menard wanted to know a month ahead of time when a meeting could be scheduled since he is very busy.

Staff Constantinides asked if the Enhancement Report was going to be refined further; he understood that it was many indices to score areas, and wanted these indices weighted and added the current status and management levels to areas. Branch offices could supply that information. Staff Yuen said that there had been discussion on formalizing and weighting the indices and that the decision making process was to go ecosystem by ecosystem to figure out unrepresented ecosystems, and then adding in specific information. This Report was meant as a rough way to prioritize.

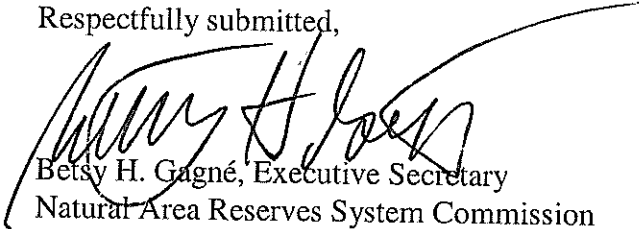
Member Jacobi said it is something to consider. Since we know we do not have all the answers and data, and trying to do this makes you think about these issues. This is a tool to make a better decision, but doesn't give the answers. We don't have a full suite of measures, although it is something we should strive for. This involves the Effective Conservation project to measure these issues spatially. Staff Constantinides requested that those management columns be added, even if they were only qualitative. Current status of land like ownership and designation is important, conservation management is good, even if there is a 1-5 or 1-3 scoring, that would be good.

Staff Cannarella said that Administrator Conry had asked him to do that kind of thing. Staff Hadway said that there is some kind of legal land framework. Staff Cannarella mentioned the State Assessment. Staff Constantinides said that actual management protection on the ground and active management was important to gather information on. Also, subzones should be considered; Staff Cannarella agreed and they should be looked at across the landscape.

Staff Yuen said that scoring management would be hard. Member Jacobi said there were two things: scoring and weighting. Staff Yuen thanked everyone for the long day of looking at maps.

Meeting was adjourned at 3:50pm.

Respectfully submitted,



Betsy H. Gagné, Executive Secretary
Natural Area Reserves System Commission

**Delegation of Selected Permitting Approval Authority for
Activities Undertaken in Natural Area Reserves**

The authority of the Natural Area Reserves System Commission (NARSC) to recommend approval of Special Use Permits is hereby delegated to the NARSC Executive Secretary, after discussion and approval by Branch staff, for the following activities conducted in Natural Area Reserves:

1. Hikes or visits by educational groups larger than ten (10);
2. Incidental traditional and customary practices (e.g., collection of maile, mokihaana)
3. The following research activities:
 - a. Non-destructive inventory, measurements, censuses, and monitoring of trees, ferns, understory plants, birds, mammals, insects, and aquatic organisms where there is no harm to the organisms (includes both ground-based and remotely sensed measures).
 - b. Non-destructive inventory, measurements, and monitoring of the forest floor, dead and downed wood, and soils.
 - c. Non-destructive inventory, measurements, and monitoring of streams, ponds, and other aquatic ecosystems.
 - d. Non-destructive hydrological and geomorphic studies which do not involve the erection of structures or long term placement of equipment.
 - e. Erection of small protective fences and barriers ≤ 10 acre in area (and the removal of exotic species within such plots).
 - f. Construction of temporary blinds and field observation structures.
 - g. Soil and plant nutrient cycling research.
 - h. Biocontrol research to control invasive plants and animals - manipulate densities of state and federally permitted biocontrol agents through redistribution and experimental methods, including caging plants or parts of plants.
 - i. Sampling air and gasses (plant and soil respiration) within the experimental forest.
 - j. Placement of temporary electronic devices for environmental monitoring or sampling (for periods ≤ 36 months).

- k. Non-destructive collection of plant material (excluding all listed T&E plants), soils, and water samples for laboratory analysis.
- l. Collection of plant and insect samples that are from common, exotic, and abundant taxa for laboratory, greenhouse, or herbarium sampling (excluding all listed T&E species).
- m. Maintenance of a trail system for access.

For purposes of this delegation, “non-destructive” means an activity that does not destroy or harm the object of analysis.

STATE OF HAWAII
Natural Area Reserves Commission

By _____
Dale Bonar
Chairperson

_____ Date

Approved by the Natural Area Reserves Commission
at its meeting held on May 21, 2007.

**Department of Land and Natural Resources
Division of Forestry and Wildlife**

1151 Punchbowl St., Room 325; Honolulu, HI 96813
(808) 587-0063, (808) 587-0064 (Fax)

Application for NARS Special Use Permit



Name: **Dr. Michael G. Hadfield**
Title of Proposed Activity: **Survey of Endangered Tree Snails in Pahole and Ka`ala NAR**

The following activities require a Special Use Permit under HAR §13-209-5. If your work in the Natural Area Reserve (NAR) will involve one or more of the following, please indicate with an 'X' below:

- ☐ remove, injure, or kill any form of plant or animal life, except game mammals and birds hunted according to department rules*
- ☐ introduce any form of plant or animal life*
- ☐ remove, damage, or disturb any geological or paleontological features or substances*
- ☐ remove, damage or disturb any historic or prehistoric remains*
- ☐ engage in any construction or improvement*
- ☐ engage in any camping activity
- ☐ establish a temporary or permanent residence
- ☐ start or maintain a fire
- ☐ litter, or to deposit refuse or any other substance
- ☐ operate any motorized or nonmotorized land vehicle or air conveyance in any area (including roads and trails) not designated for its use
- ☐ operate any motorized water vehicle of any shape or form in freshwater environments or marine waters, except as otherwise provided by DLNR's boating rules
- ☐ enter into, place any vessel or material on, or otherwise disturb a lake or pond
- ☐ engage in commercial activities, defined as "the use of or activity on state lands for which compensation is received by any person for goods or services or both rendered to customers or participants in that use or activity"
- ☐ have or possess the following tools, equipments or implements: fishing gear or devices (in `Ahihi-Kina`u NAR), cutting or harvesting gear (in any NAR), and hunting gear or tools (except as permitted by the hunting rules of the department)
- ☒ **hike or conduct nature study with a group larger than 10**
- ☐ presence in an area closed pursuant to HAR §13-209-4.5 or after visiting hours established by §13-209-4.6
- ☐ anchor any motorized or non-motorized water vehicle in the marine waters of `Ahihi-Kina`u NAR

X other (please explain): We will mark and measure endangered tree snails; we will collect dead ground shells within an existing predator exclosure in the Pahole NAR; we will take extremely small tissues samples from snails non-sacrifically for genetic studies (we have a federal permit for these activities)

* May require additional State or Federal permits. Applicants are responsible for identifying and securing all approvals that may be required.

*** Please allow for a minimum permit processing time of three months***

All permits will have the following standard conditions, pursuant to HAR § 13-209-5. Additional conditions may apply.

- 1) The permittee shall adhere to the specifications given in the permit application
- 2) Disturbance of vegetation and wildlife shall be avoided as much as possible
- 3) Precautions shall be taken to prevent introductions of plants or animals not naturally present in the area. The permittee is responsible for making sure that participants' clothing, equipment, and vehicles are free of seeds or dirt to lessen the chance of introducing any non-native plants or soil animals. Should an infestation develop attributable to the permittee, the permittee is responsible for eradication by methods specified by the department
- 4) Once approved, the permit is not transferable
- 5) Once approved, the permit does not exempt the permittee from complying with any other applicable rule or statute
- 6) The State of Hawaii shall be released and held harmless from any and all liability for injuries or death, or damage or loss of property however occurring during any activity related to the permit

I certify that the information contained in this application is true and correct.



Applicant's Signature

If approved, copies of the permit will be provided to:

- Applicant
- NARS Commission Executive Secretary
- NARS Branch staff
- DLNR-DOCARE

For internal use only:

Application received on: _____

Distributed to District staff for review on: _____

Approval () recommended () not recommended by NARS Commission or authorized representative on: _____ () with the attached special conditions.

() Approved

() Not Approved

Chairperson, DLNR

Date

Applicant Contact Information

Name: Dr. Michael G. Hadfield

If you are applying on behalf of an organization, the organization and your title: Pacific Biosciences Research Center at the University of Hawaii at Manoa.

Title of Proposed Activity: **Conservation studies of endangered tree snails in O`ahu NARs.**

Primary contact person for this permit application: Dr. Michael G. Hadfield

Mailing Address: 41 Ahui Street Honolulu HI 96813

Phone: 808- 539-7319

Fax: 808-599-4817

Email: hadfield@hawaii.edu

Supporting Information

Please provide the following information about your proposed activity that requires a special-use permit ("proposed special-use"). Failure to provide responses to the following questions may result in your application being rejected.

1. What is the period of time for which the permit is requested (e.g., the date of a proposed single event or an ongoing research project from when to when)?
 - *Please note: research permits are limited to one year in length, except where waived for permits to other governmental agencies where the board determines the waiver to be in the best interest of the State. Proposals for multi-year projects are advised of the need to apply for a new permit EACH year.*

For over 25 years Dr. Hadfield, his students and colleagues at the University of Hawaii at Manoa have carried out demographic studies of endangered tree snails in the Pahole NAR and to a lesser extent in the Mt. Ka`ala NAR. These surveys are conducted at monthly or bimonthly intervals. Because of the highly endangered status of the snails and the continuing presence of their major predators in the NARs, we foresee a continued need for these studies into the distant future; i.e., at least 10 more years. Because of the extensive amount of background information on the snails in Pahole NAR, continuation of these studies has extra value for understanding the conservation needs of endangered tree snails in the Pahole NAR and elsewhere in Hawaii.

2. List the individual Natural Area Reserve(s) involved:

Pahole and Mt. Ka`ala NARs.

3. Attach a map that illustrates where in the Natural Area Reserve(s) you propose to conduct your special-use. *The map should be legible and reproducible in black and white. The map should also be at the appropriate scale for the type of activity proposed and of sufficient detail to allow the Division to identify activity sites within 10 meters. For any activity off established trails, entry and exit routes should be marked.*

4. Provide a thorough and detailed description of the proposed special use. *The description should be detailed enough so that those reviewing your application understand what you propose to do and the scope of your proposal. As part of your description, please include: a) a description of the planned method of transportation to and within the Natural Area Reserve, and b) if other people than you will participate in the proposed special-use, please note how many people, and whether they are volunteers, students, research assistants, paying customers, etc...*

For research proposals,

- a) please explain your objectives, your methods, and why the proposed special-use is necessary to your research;*
- b) if the research is part of your undergraduate or graduate studies, please include the name and affiliation of your major professor;*
- c) if you are seeking permission to remove or introduce any form of plant or animal life, please list all species involved and specifically identify which are threatened, endangered, or candidate species.*
- d) if you are seeking permission for the collection of any specimens, please note type of specimen (species and parts collected, if less than entire specimen), quantities to be collected, storage methods, and ultimate disposition.*

Objective: The primary objective of our work is to acquire information that can benefit conservation efforts directed toward the endemic Hawaiian tree snails of the family Achatinellidae. Our recent efforts have been focused in the following areas:

- collecting demographic and life-history data for achatinellid species by using mark, release, recapture methods at field sites;
- evaluating biotic and abiotic factors that adversely affect populations of Hawaiian tree snails in captivity and in the wild;
- collaborating with the US Army/DPW Natural Resources team in collecting minute tissue samples from which we assess genetic diversity, and surveying all possible habitat of *Achatinella mustelina* throughout its range in the Wai`anae Mountains;
- developing and applying methods of molecular genetics for understanding the relationships of extant *Achatinella* species and the levels of genetic diversity within and among small remaining populations of achatinelline snails.

Mark recapture: Traditional ecological data will be collected. This includes a mark recapture study of the *Achatinella mustelina* populations in the Pahole NAR. A mark recapture study involves marking, in this case with a small number tag, all individual snails found within a given area. Upon subsequent monitoring trips all snails found within the given area are either recorded in our records if they had been previously marked, or marked, if not already. The number of marked snails found compared to the number of new snails found, over time allows us to determine the size of the population in question. In addition, the tags allow us to keep track of snail locations, growth rates, tissue sampling, etc. The following describes the standard procedure used to mark and record data from individual snails as allowed by our USFWS endangered species permit # TE826600-11:

“Snails are carefully removed by hand from their host trees and placed into a small box with window-screen sides. Snails with a shell over 10 mm in length will be

marked with a unique alpha numeric code printed onto waterproof paper that is cut out with a small hole punch and glued to the shell. Juvenile snails will be marked with paint pens by making a small dot on the shell. Length and width measurements are recorded to the nearest 0.01mm along with the presence or absence of an adult apertural lip, which indicates sexual maturity. When all visible snails at a study site have been marked and measured, they are released directly onto the respective host tree (i.e. the particular tree from which the individual was collected), or are placed in small screen baskets, which are supplied with wet leaves and hung on the branches of host trees. The nocturnally active snails crawl out of the baskets and onto the trees during the night.”

Genetic sampling: the following methods have been applied for genetic studies on *Achatinella* species, in the lab and field, without any death to the snail. A snail is allowed to crawl on a piece of sterile Parafilm. When it is fully extended, an extremely small (less than 1 mg) of tissue is sliced from the posterior tip of the foot with a sterile scalpel blade or razor blade. This operation is so minor that the snails typically do not retract. The tissue is placed into a small capped vial of 95% ethanol and returned to the lab. The snail’s shell is marked, and the snail is returned to the tree (or terrarium, in the lab) from which it was taken. The mark allows us to check on the snails to make certain they are healthy and to avoid taking repeated samples from the same snail.

Shells of dead snails (ground shells) are collected from the study site during each visit and are used for analyses of age-specific mortality and to help elucidate causes of mortality (e.g., rat predation, *Euglandina rosea* predation). All ground shells are deposited at the B. P. Bishop Museum upon completion of our studies.

To address the issue of transportation: We generally use the University of Hawaii Department of Zoology van to reach the trailhead for access to the Pahole NAR. From there, the researchers hike the trail to the snail enclosure about 30 minutes in on the trail. The survey activity is carried out by Jennifer Saufler, the research technician for the Endangered Snail Lab, and one of the student lab assistants listed at the end of this report. However, Dr. Hadfield and other named assistants or new hires may conduct the surveys.

5. Please answer the following questions about your proposed special use:
 - a. Can your proposed special use be conducted elsewhere? If not, why not?

Our research on *Achatinella mustelina* cannot be carried out elsewhere. Wild populations of endangered *Achatinella mustelina* tree snails have been declining since study of this species began. Since we have been studying the population of snails at the Pahole NAR for 25 years our data set is vast, and continuing to build on this data set provides the best overall picture of any *Achatinella* population to date. We also monitor other populations of *A. mustelina* in the Wai`anae Mts. as well as the species of *Achatinella* that occur in the Ko`olau Mts.

- b. Is your proposed special-use consistent with the purpose and objectives of the Natural Area Reserves System (the purpose and objective of the NARS is to protect in perpetuity specific land and water areas which support communities, as

relatively unmodified as possible, of the natural flora and fauna of Hawai'i)? If so, how?

We believe that our activities support the conservation purpose and objectives of the NARS by closely recording the changes that these natural populations go through. Our data provide evidence of predator activity and general health of the ecosystem in which these snails live. Our genetic studies are important for establishing the degree of isolation of populations within the NARS, that is, for estimating gene flow and in-breeding in the small snail populations.

- c. Is your proposed special-use consistent with the management plan developed for the individual Reserve(s) (*Management plans are available for review at www.dofaw.net/nars or by contacting the NARS office*)?

There is no plan available online for management of the Pahole NAR specifically, so we used the NARS general management policies to determine if our proposed activities are consistent with the overall management goals. Our stated goals "to acquire information that can benefit conservation efforts directed toward the endemic Hawaiian tree snails" are consistent with the NARS goal "to track overall status of the resource and measure changes over time". Also consistent with the NARS goal is that we, as members of the local university community, carry out this monitoring activity.

- d. Does your proposed special-use provide a benefit (direct or indirect) to the Natural Area Reserves System or to the individual Reserve(s) or both? (*For research, please note whether any studies have previously been made similar to the one proposed and how you will convey your research findings to the Department*).

Hadfield and colleagues at the University of Hawaii at Manoa have published six papers detailing, in part, with information collected from our study at the Pahole site. Our work benefits the Pahole site by helping to assure that the integrity of the site is maintained as well as increasing the body of knowledge of the rare ecological systems there. Following long-term demographic trends is the only known way to determine the "health" of fragile populations of endangered species. Our research in the Pahole NAR is a certain contribution to this effort.

Hadfield MG, Mountain BS (1980) A field study of a vanishing species, *Achatinella mustelina* (Gastropoda, Pulmonata), in the Waianae Mountains of Oahu. *Pacific Science* 34:345-357.

Hadfield MG, Miller SE, Carwile AH (1993) The decimation of endemic Hawaiian tree snails by alien predators. *American Zoology* 33:610-622.

Hadfield, M. G., B. S. Holland and K. J. Olival. 2004. Contributions of *ex situ* propagation and molecular genetics to conservation of Hawaiian tree snails. *Experimental Approaches to Conservation Biology*, M. Gordon and S. Bartol, eds. University of California Press. Pp. 16 – 34.

Holland, B. S. and M. G. Hadfield. 2002. Islands within an island: phylogeography and conservation genetics of the endangered Hawaiian tree snail *Achatinella mustelina*. *Molecular Ecology* 11:365-375.

Holland, B. S. and M. G. Hadfield. 2004. Origin and diversification of endemic Hawaiian tree snails (Achatinellidae: Achatinellinae) based on molecular evidence. *Molecular Phylogeny and Evolution* 32:588-600.

Holland, B. S. and M. G. Hadfield. 2007. Molecular Systematics of the Endangered Oahu Tree Snail *Achatinella mustelina* (Mighels, 1845): Synonymization of Subspecies and Estimation of Gene Flow Between Chiral Morphs. *Pacific Science* 61: 53 – 66.

- e. Will the proposed special-use damage or threaten to damage the integrity or condition of the natural, geological, or cultural resources in the individual Natural Area Reserve(s) and adjacent area or region? If so, how? If not, why not?

No, our study will not damage the integrity or condition of the cultural, natural or geological resources in and around our proposed study area in any way. We are interested only in collecting information about the tree snails found within the NARs.

- f. Does the proposed special-use comply with the provisions and guidelines contained in HRS Chapter 205A, entitled 'Coastal Zone Management,' where applicable? *HRS Chapter 205A can be accessed at:*
http://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0205A/

HRS Chapter 205A is not applicable to our study.

- g. Have you (the applicant) previously received a NARS Special Use Permit? If so, did you comply with the conditions of any previously approved permit (including providing a final report as requested)?

Yes, we have received NARS research permits annually since 1983.

- h. Do you (the applicant) have any other current NARS special-use permits? If so, please list and state whether you are currently in compliance with the conditions of those permits.

We do not have any other NARS permits.

- 6. Is the proposed special-use expected to have an environmental impact on the Natural Area Reserve(s) or the surrounding area? If, so please elaborate. If not, why not? *Please include discussion of any off-trail work, such as mist-netting, setting of traps, removal of vegetation, etc. and any measures planned to mitigate any short and long-term damage.*

We do not anticipate that our study will have any negative environmental impact. We may provide a positive impact via removing weeds in our study area and by killing cannibal snails (*Euglandina rosea*) found in our vicinity.

- 7. There is an application fee of \$50 to cover the cost of processing; please attach a check made out to: *Department of Land and Natural Resources*.

A check for \$50.00 is attached.

- 8. For research proposals, please list any local collaborators or contacts (if any).

For the year 2008-2009, our research team includes the following individuals:

Dr. Michael G. Hadfield - Principal Investigator

Dr. Brenden Holland – Assistant Researcher

Kevin T. Hall - Graduate student researcher

David Sischo - Graduate student researcher

Peltin O. Pelep – Undergraduate student researcher

Undergraduate lab assistants

Mark Pascua

Jana Enokawa

Ryan Hoan

We also collaborate with the U.S. Army Natural resource program for field studies.

State of Hawai`i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawai`i 96813

April 6, 2009

Chairperson and Members
Natural Area Reserves System Commission
State of Hawai`i
Honolulu, Hawai`i

NARS Commission Members:

SUBJECT: SPECIAL USE PERMIT APPLICATION BY THE U. S. ARMY TO CONDUCT SPECIFIC OFF-SITE ACTIONS IN THREE NATURAL AREA RESERVES ON O`AHU: KA`ALA, KA`ENA, AND PAHOLE, AS PART OF THE RECOVERY AND STABILIZATION OF ENDANGERED PLANT AND LAND SNAIL POPULATIONS.

BACKGROUND:

Over the past several years, there have been instances where the presence of training activities in Makua Valley have affected existing Natural Area Reserves, particularly neighboring Pahole. The Army is mandated to balance the military mission with the protection of the natural and cultural resources of Makua Military Reservation. There are certain actions that the Army must carry out if it wishes to continue to train in Makua. The Army originally filed an application January 20, 2004 to conduct mitigation in the three O`ahu Natural Area Reserves (Ka`ala, Ka`ena and Pahole), and the matter was brought before the NARS Commission for discussion and action, with permit renewals granted on an annual basis.

STAFF ANALYSIS:

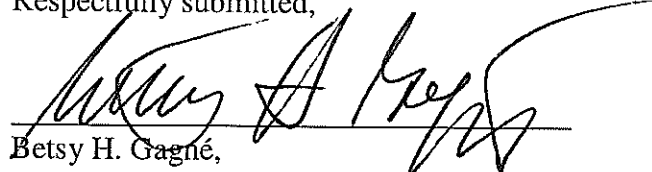
O`ahu NARS Staff have participated in many meetings over the years in an effort to reach an agreement for suitable mitigation and other efforts to stabilize rare plant taxa, native tree snails, and the O`ahu `elepaio. The Army is seeking to take specific actions (see attachments) in the three O`ahu Natural Area Reserves over the next calendar year. It is understood that the Special Use Permit would be for these actions only. The Memorandum of Understanding (MOA) for long-term actions and additional permits covering 1) Forest Reserves; 2) Pahole Mid Elevation Rare Plant Nursery; 3) State Park lands; 4) unencumbered lands administered by the Land Division still needs to be finalized,; the Special Use Permit is in effect for specific actions within the NARS **only** and is a renewal of the Special Use Permit issued in 2008 for the above specific actions, with the addition of monitoring and mark and recapture studies of the endangered O`ahu tree snail *Achatinella mustelina*.

O`ahu staff wish to place a condition on the permit, should it be approved, of seeds-only to be collected for propagation purposes; cuttings of *Flueggea* may be made, subject to staff approval.

RECOMMENDATION:

That the NARS Commission recommend approval of this permit to the Board of Land and Natural Resources for their review and final approval.

Respectfully submitted,



Betsy H. Gagné,
Division of Forestry and Wildlife

State of Hawai'i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawai'i 96813

April 6, 2009

Chairperson and Members
Natural Area Reserves System Commission
State of Hawai'i
Honolulu, Hawai'i

NARS Commission Members:

SUBJECT: REQUEST FOR APPROVAL OF DR. MICHAEL HADFIELD, UNIVERSITY OF HAWAII MANOA, TO CONTINUE SURVEYS FOR, SMALL TISSUE SAMPLES FOR GENETIC ANALYSES, AND MONITORING OF ENDANGERED TREE SNAILS, IN THE GENUS *ACHATINELLA*, WITHIN PAHOLE AND KA'ALA NATURAL AREA RESERVES, O'AHU, AND THE CONTINUED HOLDING OF INDIVIDUAL SNAILS IN CAPTIVITY IN THE LABORATORY AT UNIVERSITY OF HAWAII.

BACKGROUND:

Since the entire genus of O'ahu tree snails of the genus *Achatinella* were placed on the Endangered Species List, their numbers have continued to plummet. Actions have been taken to trap for rats, protect suitable habitat with fences, and exclude the non-native carnivorous snail *Euglandina rosea*, believed to be a key contributor to the decline of species in the wild.

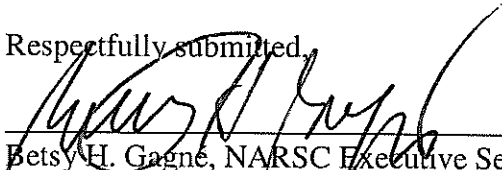
STAFF ANALYSIS:

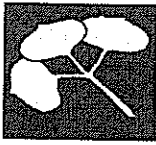
Actions to maintain captive colonies in the lab are critical to the survival of the individual species until such time as they may be reintroduced back into the wild. For now their immediate survival is insured at least in captivity. This is a renewal request to continue the work, and to gather more data on the genetics (including minute tissue samples) to further guide stabilization and recovery of species. Dr. Hadfield is the principal Permit Holder and cooperator with the US Army both within the NARS, but also on other lands not under the NARS.

RECOMMENDATION:

That the NARS Commission approve to this renewal request and forward it to the Board of Land and Natural Resources for their review and further action.

Respectfully submitted,


Betsy H. Gagne, NARSC Executive Secretary
Natural Area Reserves System Commission



O'ahu Army Natural Resources Program

Army Natural Resources Center, Bldg 1595, ER
United States Army Garrison, Hawaii [APVG-GWV]
Schofield Barracks, HI 96857-5013
Office: 655-9189 Fax: 655-9177

Directorate of Public Works
Kapua Kawelo
Biologist, Natural Resources Section
Directorate of Public Works

Natural Area Reserves System Commission
Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

March 25, 2009

Aloha Natural Area Reserves Commissioners,

The Army Natural Resources Program has been working in cooperation with the Natural Area Reserve System (NARS) for the past several years conducting conservation actions within the NARS to satisfy requirements of the Army's ESA Section 7 consultation with the USFWS and to assist the state in rare species and ecosystem level conservation actions. The current agreement of this work is supported by a NARS Special Use Permit (SUP). Both the Army and NARS recognize the need for a more detailed agreement such as a Memorandum of Understanding (MOU) or License Agreement. This document is still in progress and is championed by Marigold Zoll, DoFAW Oahu Branch Planner. Until the finalization of this document, the Army will continue to apply for a NARS SUP each year.

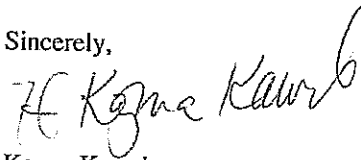
In accordance with past Army NARS SUP applications a table of proposed actions is included and outline the proposed actions for the next year for Kaena Point NAR (Enclosure 1), Mt. Kaala NAR (Enclosure 2), and Pahole NAR (Enclosure 3, 4, and 5). The tables for Pahole NAR have been divided into the three component gulches, Pahole, Pahole to Kapuna, and Kapuna to Keawapilau. These tables are used as the basis for monthly NARS action requests and reporting which are sent to NARS Biologist, Talbert Takahama. All monthly reports for the last permit period (April 2008 to February 2009) are included here (Enclosure 6). The list of proposed actions for the next permit period has not changed considerably since the last application. However, there are a few additions including new reintroduction sites and ongoing weed control actions which have already been approved by the NARS Biologist. These actions are highlighted in yellow within each table.

It is understood that all actions will be done in accordance with NARS Biologist requests and approval and that all propagules collected will be utilized under the direction of the NARS Biologist for reintroduction or genetic storage. In return, in addition to the habitat improvements outlined in the permit application and supporting documents, the Army will continue to provide the following services: providing helicopter support, maintaining access roads and trails, ungulate control, collaborating on propagation expertise, and providing population data. These actions

will be included in the MOU or License Agreement currently in development between the State and the Army for management of MIP and OIP species on State lands.

We look forward to working with you toward the completion of this permit application and our future cooperation in the management of the natural resources in the Oahu NARS. If you have any questions regarding the proposed actions table please feel free to contact Kapua Kawelo, Oahu Biologist, 656-7641, or Michelle Mansker, Oahu Natural Resource Manager, 656-2878 x 1029.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Kapua Kawelo", written over a horizontal line.

Kapua Kawelo
Biologist
Directorate of Public Works

7 Enclosures

1. Kaena NAR table
2. Kaala NAR table
- 3-5. Pahole NAR tables
6. April 2008-February 2009 monthly reports
7. Maps

**Department of Land and Natural Resources
Division of Forestry and Wildlife**

1151 Punchbowl St., Room 325; Honolulu, HI 96813

(808) 587-0063, (808) 587-0064 (Fax)

Application for NARS Special Use Permit



Name: Kapua Kawelo
Title of Proposed Activity: Army rare species stabilization actions

The following activities require a Special Use Permit under HAR §13-209-5. If your work in the Natural Area Reserve (NAR) will involve one or more of the following, please indicate with an 'X' below:

- ☒ remove, injure, or kill any form of plant or animal life, except game mammals and birds
- ☒ hunted according to department rules*
- ☒ introduce any form of plant or animal life*
- ☐ remove, damage, or disturb any geological or paleontological features or substances*
- ☐ remove, damage or disturb any historic or prehistoric remains*
- ☐ engage in any construction or improvement*
- ☒ engage in any camping activity
- ☐ establish a temporary or permanent residence
- ☐ start or maintain a fire
- ☐ litter, or to deposit refuse or any other substance
- ☐ operate any motorized or nonmotorized land vehicle or air conveyance in any area (including roads and trails) not designated for its use
- ☐ operate any motorized water vehicle of any shape or form in freshwater environments or marine waters, except as otherwise provided by DLNR's boating rules
- ☐ enter into, place any vessel or material on, or otherwise disturb a lake or pond
- ☐ engage in commercial activities, defined as "the use of or activity on state lands for which compensation is received by any person for goods or services or both rendered to customers or participants in that use or activity"
- ☐ have or possess the following tools, equipments or implements: fishing gear or devices (in `Ahihi-Kina`u NAR), cutting or harvesting gear (in any NAR), and hunting gear or tools (except as permitted by the hunting rules of the department)
- ☐ hike or conduct nature study **with a group larger than 10**
- ☒ presence in an area closed pursuant to HAR §13-209-4.5 or after visiting hours established by §13-209-4.6
- ☐ anchor any motorized or non-motorized water vehicle in the marine waters of `Ahihi-Kina`u NAR
- ☐ other (please explain): _____

* May require additional State or Federal permits. Applicants are responsible for identifying and securing all approvals that may be required.

** The NARS rules and recent rule amendments can be viewed on-line at
<http://www.state.hi.us/dlnr/dofaw/Unofficial%20compilation%20HAR%2013.209.pdf>

*** Please allow for a minimum permit processing time of three months***

All permits will have the following standard conditions, pursuant to HAR § 13-209-5. Additional conditions may apply.

- 1) The permittee shall adhere to the specifications given in the permit application
- 2) Disturbance of vegetation and wildlife shall be avoided as much as possible
- 3) Precautions shall be taken to prevent introductions of plants or animals not naturally present in the area. The permittee is responsible for making sure that participants' clothing, equipment, and vehicles are free of seeds or dirt to lessen the chance of introducing any non-native plants or soil animals. Should an infestation develop attributable to the permittee, the permittee is responsible for eradication by methods specified by the department
- 4) Once approved, the permit is not transferable
- 5) Once approved, the permit does not exempt the permittee from complying with any other applicable rule or statute
- 6) The State of Hawaii shall be released and held harmless from any and all liability for injuries or death, or damage or loss of property however occurring during any activity related to the permit

I certify that the information contained in this application is true and correct.

Applicant's Signature

If approved, copies of the permit will be provided to:

- Applicant
- NARS Commission Executive Secretary
- NARS Branch staff
- DLNR-DOCARE

For internal use only:

Application received on: _____

Distributed to District staff for review on: _____

Approval () recommended () not recommended by NARS Commission or authorized representative on: _____ () with the attached special conditions.

() Approved

() Not Approved

Chairperson, DLNR

Date

Applicant Contact Information

Name: Kapua Kawelo, Army Biologist, Army Natural Resources Program

If you are applying on behalf of an organization, the organization and your title:

Title of Proposed Activity: Army rare species stabilization actions

Primary contact person for this permit application: Kapua Kawelo

Mailing Address:

Phone: 808-656-7641

Fax: 808-656-7471

Email: kawelok@schofield.army.mil

Supporting Information

Please provide the following information about your proposed activity that requires a special-use permit ("proposed special-use"). Failure to provide responses to the following questions may result in your application being rejected.

1. What is the period of time for which the permit is requested (e.g., the date of a proposed single event or an ongoing research project from when to when)?
** Please note: research permits are limited to one year in length, except where waived for permits to other governmental agencies where the board determines the waiver to be in the best interest of the State. Proposals for multi-year projects are advised of the need to apply for a new permit EACH year.*
April 5th 2009-April 5th 2010
2. List the individual Natural Area Reserve(s) involved:
Kaala NAR, Pahole NAR, Kaena NAR
3. Attach a map that illustrates where in the Natural Area Reserve(s) you propose to conduct your special-use. *The map should be legible and reproducible in black and white. The map should also be at the appropriate scale for the type of activity proposed and of sufficient detail to allow the Division to identify activity sites within 10 meters. For any activity off established trails, entry and exit routes should be marked.*
See attachments.
4. Provide a thorough and detailed description of the proposed special use. *The description should be detailed enough so that those reviewing your application understand what you propose to do and the scope of your proposal. As part of your description, please include: a) a description of the planned method of transportation to and within the Natural Area Reserve, and b) if other people than you will participate in the proposed special-use, please note how many people, and whether they are volunteers, students, research assistants, paying customers, etc...*

For research proposals,

- a) *please explain your objectives, your methods, and why the proposed special-use is necessary to your research;*
- b) *if the research is part of your undergraduate or graduate studies, please include the name and affiliation of your major professor;*

- c) *if you are seeking permission to remove or introduce any form of plant or animal life, please list all species involved and specifically identify which are threatened, endangered, or candidate species.*
- d) *if you are seeking permission for the collection of any specimens, please note type of specimen (species and parts collected, if less than entire specimen), quantities to be collected, storage methods, and ultimate disposition.*

Failure to provide sufficient information may result in your application being returned for additional information or rejected. Please feel free to attach additional sheets as necessary.

The Army Natural Resources Program would like to utilize the NARS for rare species and ecosystem conservation. (Please see the attached documents for a more detailed description).

5. Please answer the following questions about your proposed special use:
- a. Can your proposed special use be conducted elsewhere? If not, why not?

No, a number of these species are not found outside the NARS and if the populations are found outside the NAR we are generally working there also. Please see attached prior NARS permit for specific actions and locations.

- b. Is your proposed special-use consistent with the purpose and objectives of the Natural Area Reserves System (the purpose and objective of the NARS is to protect in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna of Hawai'i)? If so, how?

Yes, the Army Natural Resources Program has similar goals and objectives related to the Army's Fish and Wildlife Service (FWS) Endangered Species Act (ESA) section 7 consultation regarding military training in Makua Military Reservation, Schofield Barracks Military Reservation, Dillingham Military Reservation, Kahuku Training Area, and Kawaihoa Training Area (see supporting documents on file with State DOFAW office: Makua Implementation Plan 2003, Oahu Implementation Plan, 2008).

- c. Is your proposed special-use consistent with the management plan developed for the individual Reserve(s) (*Management plans are available for review at www.dofaw.net/nars or by contacting the NARS office*)?

Yes, the Army Natural Resources Program is directed by specific conservation management plans (Makua and Oahu Implementation Plans) that are reviewed annually by team of biologists including State DOFAW and NARS staff.

- d. Does your proposed special-use provide a benefit (direct or indirect) to the Natural Area Reserves System or to the individual Reserve(s) or both? *(For research, please note whether any studies have previously been made similar to the one proposed and how you will convey your research findings to the Department).*

Yes, the conservation management actions conducted by the Army Natural Resources staff within the NAR is a valuable resource to NAR land managers in the form of habitat restoration, weed control, rare plant protection, rare plant monitoring, rare plant propagation and outplanting, rare snail monitoring and predator control, etc. The Army works closely with NARS staff to assure management actions conducted within the NAR are aligned with NAR goals.

- e. Will the proposed special-use damage or threaten to damage the integrity or condition of the natural, geological, or cultural resources in the individual Natural Area Reserve(s) and adjacent area or region? If so, how? If not, why not?

No. The Army Natural Resources Program's goals are to conserve and protect natural resources within the NARS.

- f. Does the proposed special-use comply with the provisions and guidelines contained in HRS Chapter 205A, entitled 'Coastal Zone Management,' where applicable? *HRS Chapter 205A can be accessed at:*
http://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0205A/

Yes. For detailed descriptions of management actions conducted within the NARS please see Army Natural Resources year end reports at
<http://www.botany.hawaii.edu/faculty/duffy/DPW.htm>

- g. Have you (the applicant) previously received a NARS Special Use Permit? If so, did you comply with the conditions of any previously approved permit (including providing a final report as requested)?

Yes, The Army submits a request to the Oahu NARS branch every month followed by a report of all activities. Please find these requests and reports attached.

- h. Do you (the applicant) have any other current NARS special-use permits? If so, please list and state whether you are currently in compliance with the conditions of those permits.

Yes, the current permit expires April 5, 2009.

6. Is the proposed special-use expected to have an environmental impact on the Natural Area Reserve(s) or the surrounding area? If, so please elaborate. If not, why not? *Please include discussion of any off-trail work, such as mist-netting, setting of traps, removal of vegetation, etc. and any measures planned to mitigate any short and long-term damage.*

Yes, the impact on the NARS is expected to be positive as the natural resources program aims to improve native ecosystems by removing non native vegetation and mammals (i.e. rodents and ungulates) and by the outplanting of both common and rare plant species. These actions are all done under the supervision of NARS staff (please see year end report at <http://www.botany.hawaii.edu/faculty/duffy/DPW.htm>)

7. There is an application fee of \$50 to cover the cost of processing; please attach a check made out to: *Department of Land and Natural Resources*.
8. For research proposals, please list any local collaborators or contacts (if any).

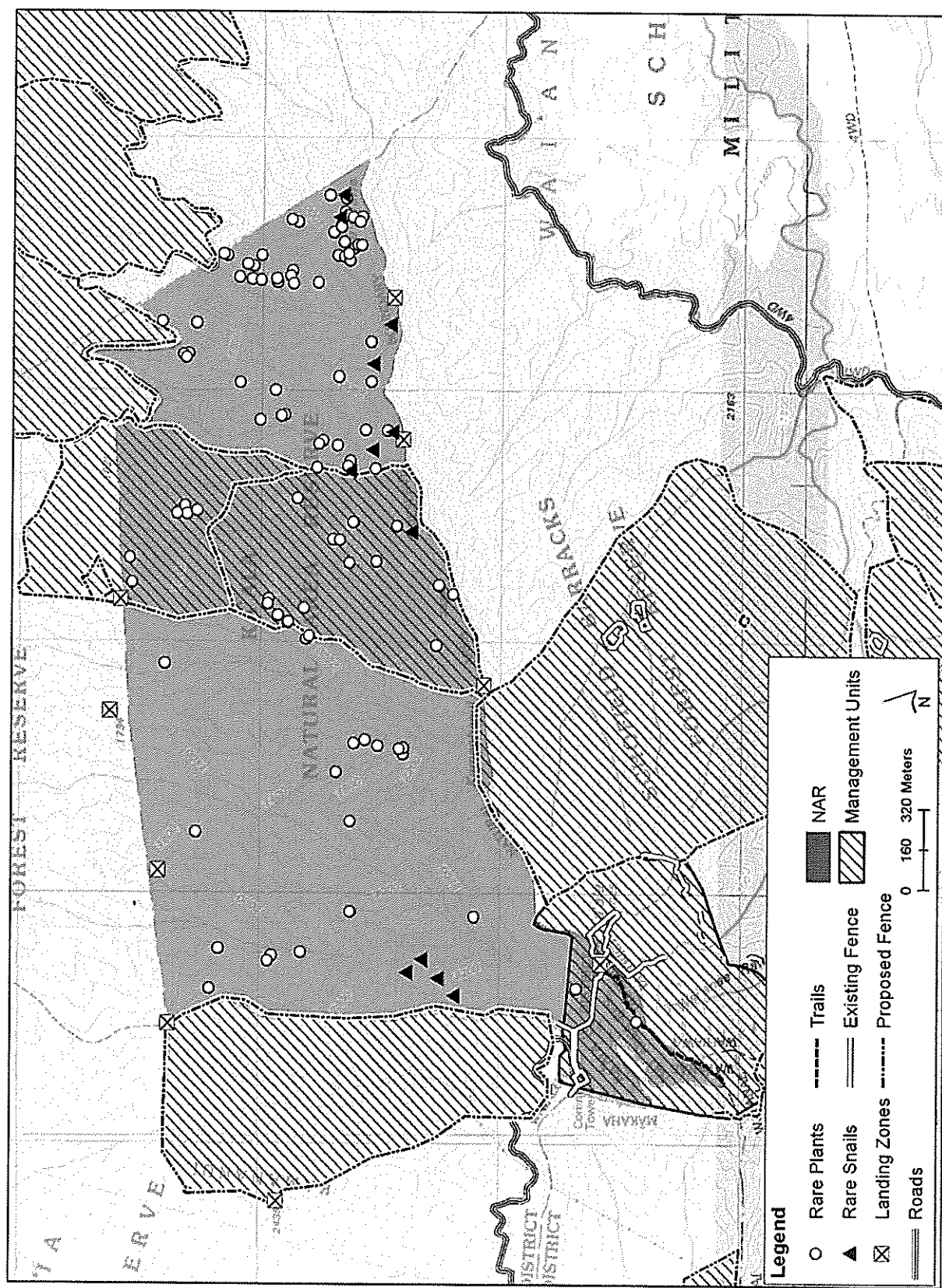


Figure 1. Kaala NAR and Army Management Units and rare species points where natural resource actions will be conducted.

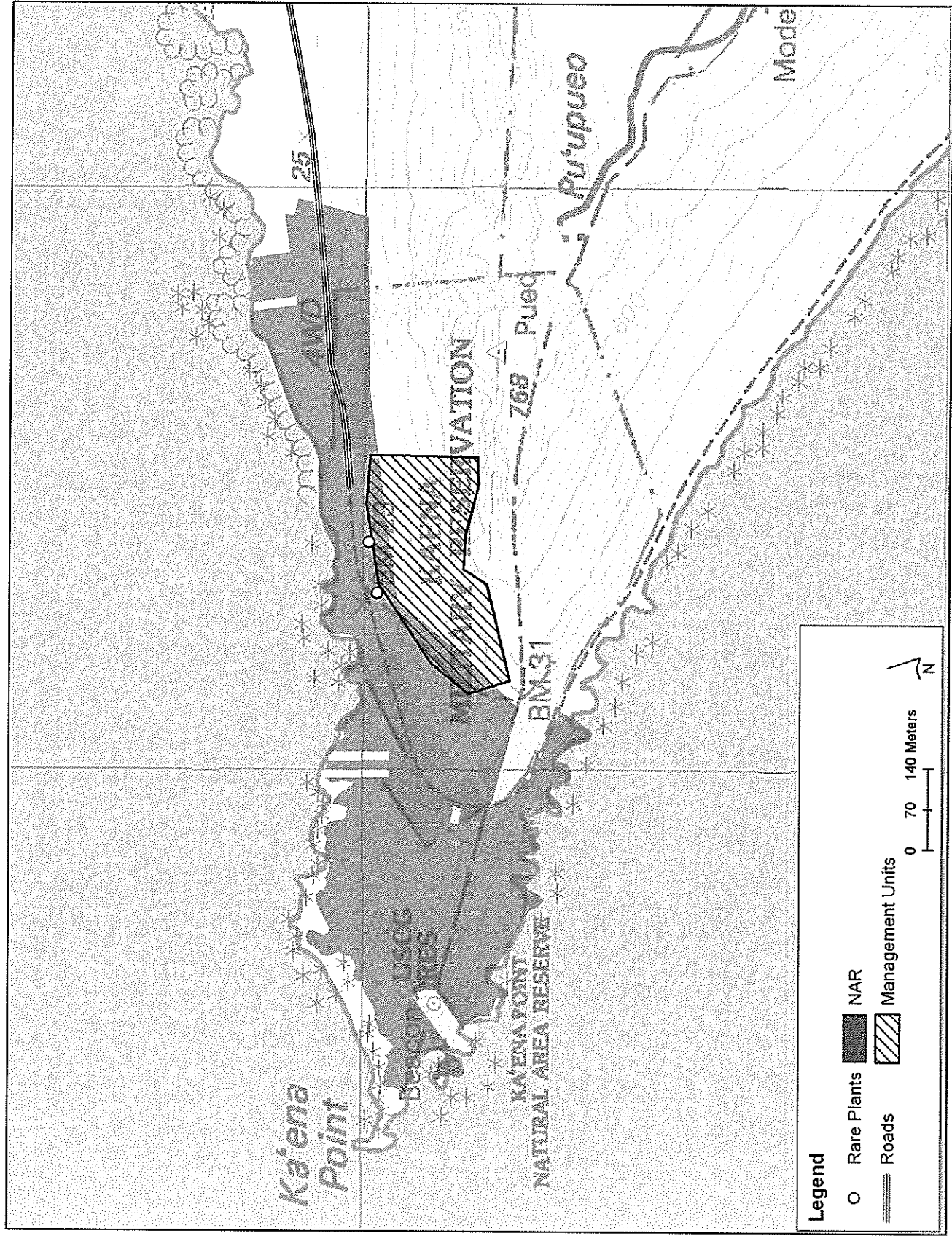


Figure 2. Kaena NAR and Army Management Units and rare species points where natural resource actions will be conducted.

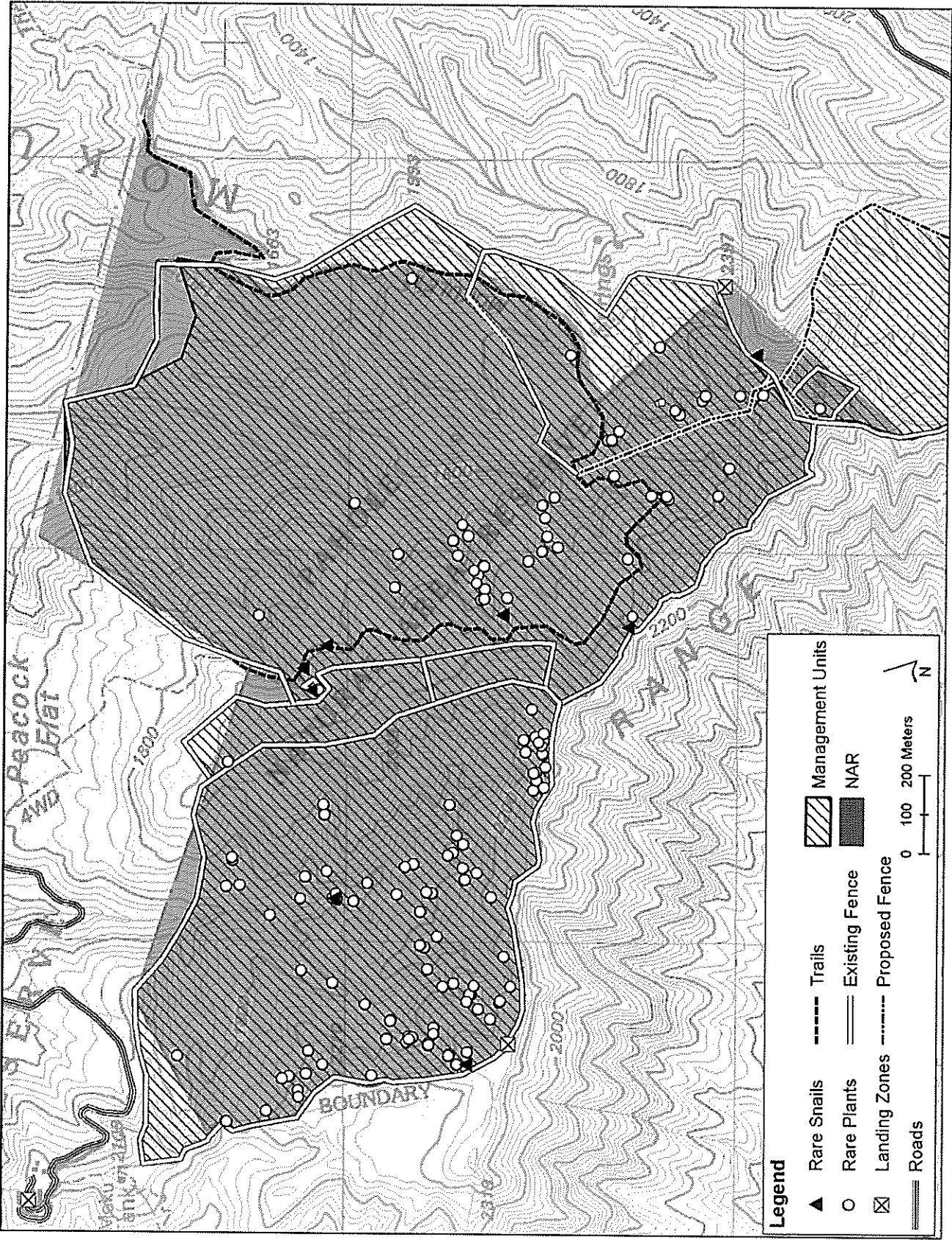


Figure 3. Pahole NAR and Army Management Units and rare species points where natural resource actions will be conducted.

Pahole NAR: Keawapilau Gulch
Army Environmental Actions

Taxa	Area / Population	Action	Frequency (trips per year)	Notes
<i>Cyanea longiflora</i>	Keawapilau - (PIL-A,B,C,D) (TT# 47, 49, 81)	Monitor populations and collect mature seeds for storage.	3	⊗ All known populations will be monitored for size, distribution and threats once this year. Mature seed will be collected from any reproductive plants for storage. These days are for collection only; additional monitoring will be done during weed control days for most populations (WCA#1 & 2).
<i>Cyanea longiflora</i> Reintroduction	PIL-E	Monitor populations and collect mature seeds for storage. Continue to supplement with additional plants.	2	
<i>Cyrtandra dentata</i>	Keawapilau- (PIL-A,B,C,D)	Monitor populations and collect mature seeds for storage.	1	⊗ All known populations will be monitored for size, distribution and threats once a year.
<i>Fluggea neowawraea</i> Reintroduction	PIL-A	Establish a new reintroduction site.	4	
<i>Nothotrichium humile</i>	Keawapilau- (PIL-A)	Monitor site and collect cuttings from any new plants.	1	Collections are not needed from any existing plants, only new founders.
<i>Phyllostegia kaalaensis</i>	Keawapilau- (PIL-A) (TT#83)	Monitor historic site for new plants.	1*	This site will be monitored for any new plants. Cuttings will be collected from any new plants for storage.
<i>Schiedea nuttallii</i>	Keawapilau- (PIL-A) (TT#47)	Monitor population and collect mature seeds for storage.	1*	This site will be monitored for any new plants. Mature seed will be collected from any new plants for storage.
<i>Schiedea obovatum</i>	Keawapilau – (PIL-B) (TT# 47)	Monitor site for new plants and collect mature seeds for storage.	1*	This task will be done when conducting weed control in the area and not as a separate trip.
<i>Schiedea obovatum</i> Reintroduction	Keawapilau- (PIL-C)	Monitor population and continue to reintroduce until the founders are balanced.	3	Monitoring will be done when conducting weed control in the area. Three trips are necessary to scope the reintroduction, plant, then monitor the planting this year.
<i>Schiedea obovatum</i>	Makaleha- (LEH-B)	Monitor site for new plants and collect mature seeds for storage.	1*	This task will be done when conducting weed control in the area and not as a separate trip.
PU Weed Control	WCA: UpperKapuna-02	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	3	Almost continuous with the WCA #4, this site covers the ridge-top at the Schnut down to and below the Cyalon.
PU Weed Control	WCA: UpperKapuna-04	Weed control of canopy and understory to improve habitat quality and manage	3	The site from around the Phykaa reintroduction to the ridge top including the Cyalon.

		populations for stability.		
PU Weed Control	WCA: UpperKapuna-05	Maintenance of a cleared corridor along the fenceline.	1	This WCA encompasses the fenceline. Control will be scheduled as needed, to remove trees fallen on to the fence, to control grass along the fence, etc.
PU Weed Control	WCA: UpperKapuna-06	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	This site includes the reintroduced Schobo.
PU Weed Control	WCA: UpperKapuna-10	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	This site includes the wild Schobo. The area is small and weed control will focus on understory species.
MU Weed Control	Keawapilau	Expand weed control into larger MU esp. to target priority sp., and to create potential reintro sites	4	Priority projects as determined with NARS Biologist outside of PU weeding areas.
Incipient invasive weed control	UpperKapuna- <i>Rubus argutus</i> -01	Prevent the spread of this incipient invasive; eradicate.	4*	Treat during PU weed control in WCA #4.
Incipient invasive weed control	UpperKapuna- <i>Rubus argutus</i> -02	Prevent the spread of this incipient invasive; eradicate.	4*	Treat during PU weed control in WCA #6.
Incipient invasive weed control	UpperKapuna- <i>Angiopteris evecta</i> -01	Prevent the spread of this incipient invasive; eradicate.	2*	Initial knockdown of population complete, twice a year monitoring and treatment sufficient.
Incipient invasive weed control	UpperKapuna- <i>Angiopteris evecta</i> -02	Prevent the spread of this incipient invasive; eradicate.	2	Initial knockdown of population complete, twice a year monitoring and treatment sufficient.
Incipient invasive weed control	UpperKapuna- <i>Angiopteris evecta</i> -04	Prevent the spread of this incipient invasive; eradicate.	2	Initial knockdown of population required.
Weed Surveys	LZs	Survey LZs for weeds	4*	During helicopter operations, conduct weed surveys of LZs to monitor for potential weed spread
Rare Plant Surveys		Access to survey for new populations of target taxa.	3	
Ungulate Control	Keawapilau	Goat eradication in NAR	2	Monitor twice a year or as requested by NARS Biologist to ensure that there are no goats in the Pahole NAR. Hunting assistance (not included in frequency) will be provided to respond as needed.

* : Designates work days partnered with other activities and therefore not counted towards the total number of days NRS expect to work in the NAR.

✧ : Designates that at least one trip will be required to visit and document population locations, size, distribution and threats with NARS Biologist.

Pahole NAR: Kapuna Gulch
Army Environmental Actions

Taxa	Area / Population	Action	Frequency (trips per year)	Notes
<i>Alectryon macrococcus</i> var. <i>macrococcus</i>	Kapuna- (KAP-A)	Search for any live trees.	2	All historic sites will be searched. Any existing trees will be monitored and assessed for collection. Collection will be done in coordination with the State Horticulturist.
<i>Chamaesyce herbstii</i>	Kapuna- (KAP-A,B,C,E) (TT # 19, 73,77)	Monitor populations and collect mature seeds for reintroduction and storage.	5	All known populations will be monitored and mature seed will be collected for propagation. This will require one day for monitoring and installing the collection bags. Then additional days are needed for monitoring and collecting the fruit when mature.
<i>Cyanea longiflora</i>	Kapuna - (KAP-B) (TT# 18/65)	Monitor population and collect mature seeds for storage.	1*	The known population will be monitored for size, distribution and threats once a year. Mature seed will be collected from any reproductive plants for storage.
<i>Cyanea superba</i> subsp. <i>superba</i>	Kapuna- (KAP-A, B)	Monitor reintroductions and collect seeds from genetically unique individuals for storage.	4	Collect mature seeds for storage. Predator control may be necessary to protect maturing fruit.
<i>Cyrtandra dentata</i>	Kapuna- (KAP-A, B, C) (TT# 76)	Monitor population and collect mature seeds for storage.	3*	All known populations will be monitored for size, distribution and threats once this year. Mature seed will be collected from any reproductive plants for storage. Monitoring and collecting from these will be combined with other trips.
<i>Delissea subcordata</i>	Kapuna- (KAP-D)	Supplement reintroduction with additional plants and monitor.	3*	Monitoring will be done when conducting weed control in the area. This site will be supplemented with more plants this year. Three trips are necessary to scope the reintroduction, plant, then monitor the planting.
<i>Fluggea neowawraea</i>	Kapuna- (KAP-A) (TT#87)	Monitor tree and collect mature seeds and cuttings for storage.	1*	The tree will be monitored once during other weed control trips for reproduction and threats. Collection will be done in coordination with the State Horticulturist.
<i>Phyllostegia kaalaensis</i>	Kapuna- (KAP-B)	Monitor population and reintroduce additional plants.	3	Monitoring will be done when conducting weed control in the area. Three additional trips are necessary to scope the reintroduction, plant, then monitor the planting.
<i>Schiedea kaalae</i>	Kapuna- (KAP-A)	Monitor population and reintroduce additional plants.	3*	Monitoring will be done when conducting weed control in the area. Three trips are necessary to scope the reintroduction, plant, then monitor the

				planting this year.
PU Weed Control	WCA: UpperKapuna-01	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	4	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: UpperKapuna-02	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Kapuna stream reintro site . Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: UpperKapuna-07	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	4	1-acre site. Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: UpperKapuna-08	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Wild Delsub location. Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: UpperKapuna-09	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Site includes reintroduced Delsub population. Effort will focus around reintroduction.
PU Weed Control	WCA: UpperKapuna-11	Weed control of canopy and understory to improve LZ.	2	NRS will work with NARS Biologist and NARS staff to keep LZ clear.
MU Weed Control		Kapuna- Expand weed control into larger MU esp. to target priority sp. and create potential reintro sites.	1	✱ Priority projects as determined with NARS Biologist outside of PU weeding areas.
Incipient invasive weed control	UpperKapuna - <i>Desmodium intortum</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Treat around Hunter Cabin.
Incipient invasive weed control	UpperKapuna - <i>Desmodium intortum</i> - 02	Prevent the spread of this incipient invasive; eradicate.	4*	Treat along Mokuleia trail.
Incipient invasive weed control	UpperKapuna – <i>Neonotonia wightii</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Treat around Hunter Cabin.
Incipient invasive weed control	UpperKapuna – <i>Neonotonia wightii</i> - 02	Prevent the spread of this incipient invasive; eradicate.	4*	Treat along Mokuleia trail.
Incipient invasive weed control	UpperKapuna – <i>Ehrharta stipoides</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Treat along Mokuleia trail.
Incipient invasive weed control	UpperKapuna – <i>Ehrharta stipoides</i> - 02	Prevent the spread of this incipient invasive; eradicate.	4*	Treat at site east of Mokuleia trail.
Incipient invasive weed control	UpperKapuna – <i>Ehrharta stipoides</i> - 03	Prevent the spread of this incipient invasive; eradicate.	4*	Treat at site west of Mokuleia trail, near trailhead.

Incipient invasive weed control	UpperKapuna – <i>Angiopteris evecta</i> - 03	Prevent the spread of this incipient invasive; eradicate.	2*	Initial knockdown complete. Twice a year follow up sufficient.
Incipient invasive weed control	UpperKapuna – <i>Grevillea robusta</i> - 03	Target Grerob throughout MU.	2	Follow direction of NARS biologist to remove Grerob from fence.
Weed Surveys	LZs	Survey LZs for weeds	4*	During helicopter operations, conduct weed surveys of LZs to monitor for potential weed spread
Ungulate Control	Kapuna	Monitor and maintain fences.	4*	Once the fence is built, coordinate with NARS biologist to inspect and maintain once a year or as needed to ensure integrity. This task will not require a separate trip. Fence can be monitored once a quarter, once complete.
Rare Plant Surveys		Access to survey for new populations of target taxa with the Hawaii Natural Heritage Program Botanist.	3	

* : Designates work days partnered with other activities and therefore not counted towards the total number of days NRS expect to work in the NAR.

☼ : Designates that at least one day will be required to visit and document population locations, size, distribution and threats with NARS Biologist.

Pahole NAR: Pahole Gulch
Army Environmental Actions

Taxa	Area / Population	Action	Frequency (trips per year)	Notes
<i>Achatinella mustelina</i>	Pahole Snail Enclosure (PAH-A)	Monitor and maintain the enclosure structure.	4	Maintenance such as rat baiting and salt trough filling in addition to enclosure maintenance.
<i>Achatinella mustelina</i>	Pahole Snail Enclosure (PAH-A)	Mark and recapture snails in enclosure.	2	Mark/recapture and other population assessments will be done at least once a year and will be coordinated with Dr. Mike Hadfield.
<i>Alectryon macrococcus</i> var. <i>macrococcus</i>	PAH-A PAH-B PAH-F PAH-G	Search for any live trees. Assess material for collection with the State Horticulturist.	2	All historic sites will be searched. Any existing trees will be monitored and assessed for collection. Collection will be done in coordination with the State Horticulturist.
<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i> Reintroduction	PAH-A	Monitor population and collect mature seeds for storage. Continue to supplement with new plants.	2	Two trips a year for monitoring and collection.
<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i>	PAH-B	Monitor population and collect mature seeds for storage and reintroduction.	2	Two trips a year for monitoring and collection.
<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i>	PAH-C	Monitor population and collect mature seeds for storage and reintroduction.	2	Two trips a year for monitoring and collection.
<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i> Reintroduction	PAH-D	Monitor population and collect mature seeds for storage and reintroduction. Continue to supplement with new plants.	2	Two trips a year for monitoring and collection.
<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i>	PAH-E	Monitor population and collect mature seeds for storage and reintroduction.	2	Two trips a year for monitoring and collection.
<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i> Reintroduction	PAH-F	Monitor population and collect mature seeds for storage and reintroduction. Continue to supplement with new plants.	2	Two trips a year for monitoring and collection.
<i>Chamaesyce herbstii</i>	PAH-E PAH-F PAH-G PAH-H PAH-I	Monitor population and collect mature seeds for storage and reintroduction.	8	Up to eight trips to attempt to secure collections from uncollected plants.

<i>Chamaesyce herbstii</i>	PAH-R	Monitor population and collect mature seeds for storage and reintroduction. Continue to supplement with new plants.	8*	
<i>Cyanea grimesiana</i> subsp. <i>obatae</i>	PAH-A (TT#09) PAH-B (TT#9/30)	Monitor populations and collect mature seeds for storage and reintroduction.	4	
<i>Cyanea grimesiana</i> subsp. <i>obatae</i> Reintroductions	PAH-C PAH-D	Monitor populations and collect mature seeds for storage.	3	Up to three trips may be needed to ensure timing for ripe fruit. Specifically targeted for collection are decedents of dead Pahole founders for reintroduction.
<i>Cyanea longiflora</i>	PAH-A (TT#69) PAH-B (TT#06) PAH-C (TT#96) PAH-G (TT#91) PAH-H PAH-I	Monitor all populations and collect mature seeds for storage and reintroduction.	4	Up to four trips may be necessary in order to collect mature seeds from all populations.
<i>Cyanea superba</i> subsp. <i>superba</i>	PAH-A PAH-B	Monitor populations and collect mature seeds for storage and reintroduction at PAH-A. (Rat control may be necessary)	8	
<i>Cyrtandra dentata</i>	PAH-A PAH-B PAH-C PAH-D PAH-E PAH-F PAH-G	Monitor population.	4*	To occur during access planned for other taxa.
<i>Delissea subcordata</i>	PAH-B (TT#30)	Monitor and collect for storage and reintroduction.	2	
<i>Delissea subcordata</i> Reintroduction	PAH-C	Monitor population and collect mature seeds for storage.	3	
<i>Delissea subcordata</i>	PAH-E (TT#26)	Monitor and collect for storage and reintroduction.	2	
<i>Hedyotis degeneri</i> var. <i>degeneri</i>	PAH-A (TT#88) PAH-B (TT#92)	Monitor populations and collect mature seeds for storage.	2	
<i>Fluggea neowawraea</i>	PAH-A (TT#54) PAH-C (TT#85)	Monitor populations and collect cuttings for propagation and mature seeds for storage.	2	The trees will be monitored for health and reproduction twice. Mature fruit will be collected for storage and fewer than 20 cuttings and/or 6 airlayers will be salvaged for propagation this year. Collection will be done in coordination with the State Horticulturist.
<i>Phyllostegia kaalaensis</i> Reintroduction	PAH-B	Monitor population.	2*	To occur during access planned for other taxa.

<i>Plantago princeps</i> var. <i>princeps</i>	PAH-A	Monitor population and collect mature seeds for storage.	3	Three days to ensure collection of mature seed.
<i>Schiedea kaalae</i>	PAH-A (TT#46) PAH-B (TT#51)	Monitor population and collect mature seeds for storage and reintroduction.	2	
<i>Schiedea kaalae</i> Reintroduction	PAH-C	Monitor population and collect mature seeds for storage and reintroduction.	2	
<i>Schiedea nuttallii</i>	PAH-A (TT#69) PAH-B (TT#94)	Monitor populations and collect cuttings and/or mature seeds for storage and reintroduction.	3	Three days to ensure collection of mature seed.
<i>Schiedea nuttallii</i> Reintroduction	PAH-D	Monitor population and collect mature seeds for storage and reintroduction. Continue to supplement with new plants.	3*	These tasks will not require independent trips.
<i>Schiedea nuttallii</i> Reintroduction	PAH-E	Monitor population and collect mature seeds for storage and reintroduction. Continue to supplement with new plants.	3*	These tasks will not require independent trips.
<i>Schiedea obovata</i> Reintroduction	PAH-D	Monitor populations and collect mature seeds for storage. Continue to supplement with new plants.	3	One trip a year to conduct weed control, monitoring and collection. Two additional days for collection to ensue timing for ripe fruit. Specifically targeted for collection are decedents of dead Pahole founders for reintroduction.
<i>Schiedea obovata</i> Reintroduction	PAH-E	Monitor populations and collect mature seeds for storage. Continue to supplement with new plants.	3	One trip a year to conduct weed control, monitoring and collection. Two additional days for collection to ensue timing for ripe fruit. Specifically targeted for collection are decedents of dead Pahole founders for reintroduction.
PU Weed Control	WCA: Pahole-01 (formerly WCA#6)	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: Pahole-02 (formerly WCA#3, Gulch I)	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: Pahole-03 (formerly WCA#2, nr. Cenagr. TT#27)	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: Pahole-04 (formerly WCA#5)	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: Pahole-05 (in Gulch 4)	Weed control of canopy and understory to improve habitat quality and manage	4	Effort will focus around wild and reintroduced rare species.

		populations for stability.		
PU Weed Control	WCA: Pahole-06 (formerly WCA#4)	Weed control of canopy and understory to improve habitat quality and manage populations for stability. Weed control at the east end of the Pahole rim.	2	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: Pahole-08	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Effort will focus around wild and reintroduced rare species.
PU Weed Control	WCA: Pahole-09	Weed control of canopy and understory to improve habitat quality and manage populations for stability.	2	Effort will focus around wild and reintroduced rare species.
Incipient invasive weed control	Pahole – <i>Ehrharta Stipoides</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Monitor trail side site regularly and treat as needed.
Incipient invasive weed control	Pahole – <i>Ehrharta Stipoides</i> - 02	Prevent the spread of this incipient invasive; eradicate.	4*	Monitor trail side site regularly and treat as needed.
Incipient invasive weed control	Pahole – <i>Ehrharta Stipoides</i> - 03	Prevent the spread of this incipient invasive; eradicate.	4*	Monitor trail side site regularly and treat as needed.
Incipient invasive weed control	PaholeNoMU – <i>Ehrharta Stipoides</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Monitor trail side site regularly and treat as needed.
Incipient invasive weed control	Pahole – <i>Montanoa hibiscifolia</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Treat any Monhib found within the fenced unit.
Incipient invasive weed control	PaholeNoMU – <i>Montanoa hibiscifolia</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Isolated site outside of fenced unit. Monitor and treat as needed.
Incipient invasive weed control	Pahole – <i>Pterolepis glomerata</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Monitor regularly as hike along trail; treat as needed. High priority.
Incipient invasive weed control	Pahole – <i>Tecoma capensis</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Treat site along Makua Rim fence
Incipient invasive weed control	Pahole – <i>Triumphetta semitriloba</i> - 01	Prevent the spread of this incipient invasive; eradicate.	4*	Monitor regularly over year; treat as needed.
Incipient invasive weed control	Pahole – <i>Zingiber zerumbet</i> - 01	Prevent the spread of this incipient invasive; eradicate.	2*	Low priority site; species not actively spreading

Weed Surveys	LZs	Survey LZs for weeds	4*	During helicopter operations, conduct weed surveys of LZs to monitor for potential weed spread
Ungulate Control	Pahole Fenceline	Monitor and maintain Pahole fence.	4	Once a quarter or as directed by NARS staff.
Cenagr, Chaher, Cyagrioba, Cyalon, Delsub, Phykaa, Schkaa, Schnut, Schobo	Pahole Gulch	Reintroduce as outlined in reintroduction plans.	14-30	Approximately 2 days per species which is 19 days. If rainfall is limited, may need up to 30 days for watering.
Rare Plant Surveys	Pahole Gulch	Search historic sites.	2	
Monitoring	Pahole Gulch	Monitoring control plots	12	Monitoring trends on rat, slug, and <i>Euglandina rosea</i> populations in Pahole to compare to Kahanahaiki.

* : Designates work days partnered with other activities and therefore not counted towards the total number of days NRS expect to work in the NAR.

Ka`ena NAR
Army Environmental Actions

Taxa	Area/ Population	Action	Frequency (times per year)	Notes
<i>Chamaesyce celastroides</i> var. <i>kaenana</i>	Kaena Pt./KAE-B	Monitor plants.	2*	Frequency depends on how many trips it takes to monitor the site. The monitoring trips will be combined with weed control in WCA #1.
PU Weed Control	WCA #1	Manage for stability by conducting weed control around <i>Chamaesyce</i> KAE-B.	4	Weed control in the WCA requires regular follow-up and maintenance, particularly for grass species. Species targeted will include: <i>Atriplex semibaccata</i> , <i>Leucaena leucocephala</i> , <i>Acacia farnesiana</i> , <i>Achyranthes aspera</i> , <i>Panicum maximum</i> , <i>Digitaria insularis</i> .
PU Weed Control	WCA #1	Manage for stability by conducting weed control around <i>Chamaesyce</i> KAE-B.	2	Plant common native species (<i>Eragrostis variabilis</i> , <i>Myoporum sandwicensis</i>) to facilitate weed suppression.
Monitoring	WCA #1	Monitor efficacy of weed control efforts.	2*	Photopoints have been established in the Weed Control Area. NRS will retake them twice a year. If other monitoring techniques are deemed necessary, NRS will consult with the State Botanist to determine another monitoring scheme.
PU Weed Control	WCA #2	Manage for stability by conducting weed control around <i>Chamaesyce</i> KAE-B.	6	Weed control in the WCA requires regular follow-up and maintenance, particularly for grass species. Species targeted will include: <i>Atriplex semibaccata</i> , <i>Leucaena leucocephala</i> , <i>Acacia farnesiana</i> , <i>Achyranthes aspera</i> , <i>Panicum maximum</i> , <i>Digitaria insularis</i> .
PU Weed Control	WCA #2	Manage for stability by conducting weed control around <i>Chamaesyce</i> KAE-B.	2*	Plant common native species (<i>Eragrostis variabilis</i> , <i>Myoporum sandwicensis</i>) to facilitate weed suppression.
Monitoring	WCA #2	Monitor efficacy of weed control efforts.	2*	Photopoints will be established in the Weed Control Area. NRS will retake them twice a year. If other monitoring techniques are deemed necessary, NRS will consult with the State Botanist to determine another monitoring scheme.

* : Designates work days partnered with other activities and therefore not counted towards the total number of days NRS expect to work in the NAR.

Table explanations

The tables for each NAR have five columns. The "Taxa" column indicates the target taxa covered by the action (listed species of plant or snail, or weed or ungulate control.) The "Area/Population" column describes the location with a common or gulch name and a population reference code that is tracked in the Army rare plant database. The Army has also included the corresponding number that Mr. Takahama uses for each site (TT#30) when it was available. If the site number used by Mr. Takahama was unknown, the population code is marked "TT#??" For reintroductions that have no NAR number, "TT#n/a" was used. This allows for clear communication between the State and the Army tracking systems.

The "Action" column described the proposed action. The "Frequency (trips per year)" column estimates the number of visits needed to complete the action. An asterisk (*) is used to denote those trips where many actions can be combined and the action is not to be counted toward the total. For example, collections are often done on weed control trips and do not require additional trips for collection alone. In the most complex example, there may be a number with an asterisk and an additional number without one. For these actions, the action with the * will be completed during trips that are primarily for some other tasking while the additional number indicates actions that require additional trips. For example, for management of *Chamaesyce herbstii* in Pahole gulch, collection is expected to require up to eight trips in an approximately two month period and six trips are required to control weeds at all the sites. We propose to combine weed control and collection on three of these trips but are also requesting to do weed control on three other trips when we are not involved in collection and five other collection trips without weed control. The weed control trips would be scheduled during the non-fruiting season. The "Notes" column records any notes specific to the action.

Lower Ka'ala NAR
Army Environmental Actions

Taxa	Area/Population	Action	Frequency (trips per year)	Notes
<i>Abutilon sanwicense</i>	Palikea/Manuwai/ Kaimuhoie- (ALI-A, C; ANU-A-G; IMU- A)	Monitor populations and collect mature seed for storage.	3*	Plants will be monitored for threats and mature fruit will be collected for storage from any new founders.
<i>Achatinella mustelina</i>	Alaiheie - (IHE-A)	Monitor and survey for additional populations.	2	Known sites will be monitored once this year to determine population size, distribution and trends. One additional trip will be needed for surveys.
<i>Achatinella mustelina</i>	Palikea	Monitor and survey for additional populations.	2	Known sites will be monitored once this year to determine population size, distribution and trends. One additional trip will be needed for surveys.
<i>Achatinella mustelina</i>	Manuwai - (ANU-A)	Monitor and survey for additional populations.	2	Known sites will be monitored once this year to determine population size, distribution and trends. One additional trip will be needed for surveys.
<i>Cyanea grimesiana</i> subsp. <i>obatae</i>	Palikea- (ALI-A)	Monitor site and maintain fence.	2	Monitor and maintain the existing small fence and monitor the plant for new threats and reproduction. This action will be done during monitoring trip that will cover several species in this area.
<i>Cyanea grimesiana</i> subsp. <i>obatae</i>	Palikea- (ALI-A)	Collect mature seed for storage.	2*	This plant is still immature. If mature seed is produced it will be collected for storage. (This may require more than one visit to collect).
<i>Delissea subcordata</i>	Palikea- (ALI-A)	Monitor populations and collect mature seed for storage.	2*	Plants will be monitored for threats and mature fruit will be collected for storage from any new founders.
<i>Hedyotis degneri</i> <i>degneri</i>	Alaiheie/Palikea/ Manuwai- (IHE- A,B,C; ALI-A; ANU- A)	Monitor populations and collect mature seed for storage.	3	There are many small populations across the NAR, and they will be monitored once annually to assess population size and assess the threat of goats in the area. Mature seed will be collected for storage. Three trips will be needed to visit all known sites this year.
<i>Melanthera tenuifolia</i>	Manuwai (ANU-A)	Monitor population and assess ungulate threat.	1*	The population will be monitored for size and distribution and to ensure ungulate sign is low. Trips will be coordinated with hunts proposed for this area.
<i>Phyllostegia kaalaensis</i>	Palikea- (LKN-A)	Monitor historic site.	1*	This site will be checked once in the coming year for new plants while monitoring other plants.

Ungulate Control	LKN	Conduct goat control efforts in partnership with other agencies.	6	At least two goat hunts with DLNR, USDA and helicopter support. Another two days will be spent beginning ground scoping and hunting trips to determine the size and current distribution of ungulates in the NAR.
Rare Plant Surveys		Access to survey for new populations of target taxa.	3	
Road Maintenance	LKN Road	Assist NARS staff with regular road maintenance.	3	Continue as we have to assist in spraying and chainsaw work to keep the road open.
Weed Surveys	LZs	Survey LZs for weeds	4*	During helicopter operations, conduct weed surveys of LZs to monitor for potential weed spread
Weed Surveys	LKN Road	Conduct road survey	1	Once fence work begins and NRS activities along road increase, NRS will conduct annual weed surveys along the road to monitor for potential weed spread.

* : Designates work days partnered with other activities and therefore not counted towards the total number of days NRS expect to work in the NAR.

Proposed Actions for NARs Oahu April 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done on this date?
Green (MB/SM)	4/1/08	Pahole	Fence line, Plapripri, Pteglo, snail enclosure	3	Check fence line. Monitor Plapripri, Pteglo, Trisem, and reset bait grid	Yes (4ppl)
Green (MB/SM)	4/7/08	Pahole	Snare groups	4	Check snares.	Yes (4ppl)
Green (MB/SM)	4/9/08	Pahole	Gulch 2	2	Collect cuttings and place airlayers on Fluneo. * Doug Okamoto will be escorting.	Yes (3ppl)
Green (MB/SM)	4/17	Pahole	Snail jail/Lookout	5	Cenagr collections and WCA weeding	Yes (3ppl)
Green (MB/SM)	4/21	Pahole	Snare groups	4	Check snares.	Yes (2ppl)
Blue (JG/MW)	4/8*	Kapuna	FluNeo.KAP-A, CyaLon.PIL-B & SchObo.PIL-C	4	Airlayer FluNeo with Doug O., weed SchObo reintroduction, Monitor CyaLon	Yes, but only got to collect/airlayer Fluneo. No time to do other actions.
Blue (JG/MW)	4/29/08 **	Kapuna/Keawapilau	Schobo PIL-C, & PIL-B, Delsub KAP-D, Phykaa/Schkaa reintro	4	Check plants reintroduced this year, collect from wild Schobo #2, weed around reintro plants.	Yes. Schobo #2 died, but found 27 indiv <5cm.
Blue (JG/MW)	4/30	Kaena	ChaCelKae.KAE-B	4	Continued weeding around new pop., scope for common reintros.	Yes, but date changed to 4/16.

* = Request Doug Okamoto accompaniment on this date

** = Date requested by phone and/or email after initial actions submitted

Work Summary for Oahu NARs April

Green Team

4/1/08: MB, LA, LB, KW checked the fenceline for any breaks. The fence was in good shape. Took baby sledge hammers to pound in any post if needed, some required a little pounding but was not entirely effective. Still need to install a little skirting in some areas. Reset the baits and snaps around the snail enclosure. Monitored the Plapripri and found one plant with flowers and buds. Will monitor again in May. Monitored Ehrsti sites (need to go back and spray a couple), Trisem (hand-pulled at all sites along fence and collected the seeds of all mature), and Pteglo (sprayed area).

4/7/08: LA, LB, PT, MH checked all the snare groups in the fence with no new catches observed. No new snares put out. Monitored and collected divisions or seeds from Cenagr PAH-B-107 (1 division), 109 (7 mature fruit), 127 (1 division), 133 (1 division), 140 (1 division), 141 (1 division), 142 (1 division). PAH-B 116 and 121 were not collected from as they were too small and no mature fruit. Looks like there are 3 new dead plants but there are 6 new immatures, 1 new seedling, and it appears that 2 plants have split off some clones.

4/9/08: MB, JR, DO monitored, collected cuttings and installed airlayers on Fluneo PAH-A-1 (3 cuttings and 1 airtlayer) and PAH-C-1 (3 cuttings and 2 airtlayers) and 2 (2 cuttings and 1 airtlayer).

4/17/08: LB, LA, JB weeded around in the Cenagr PAH-A site. Also collected 1 division from 311 and 309, wanted to from 304 and 130 but they were dead.

4/21/08: PT, LA checked all the snare groups in the fence with 1 new catch at the upper 2/3 ridge group (not aged but appeared to be about 25-30 lbs). No new snares put out but there did appear to be some sign in Gulch 2 from a small pig and a couple of snares were knocked. Had hoped that we were done but there still seems to be some stragglers yet. Will continue with the operation and scope some new sites.

Blue Team

4/8/08: VC, AH, JG and Sheldon Plentovich. AH and SP set up an ant collection transect along Mokuleia trail, around the Flunio in Kapuna, and at the Peacock Flats campsite. Rain interfered with collection, but some interesting specimens found (SP still investigating). JG, VC, DO and intern set up ropes in Flunio so could safely airlayer plant. Two airlayers put on tree on this date, and a few cuttings taken.

4/16/08 (originally scheduled for 4/30/08): MW, JG, VC, AH weeded *leuleu* around newer west patch. Photopoints were taken. Kawelu grass outplantings were monitored (several have died).

4/29/08: JG, MW, AH and Kelly Perry (from Waimea Valley): Staff changed temporary tags to permanent tags at the Delsub reintro KAP-C. Found a new patch of Ehrsti outside of the fence. Will treat next time. MW downloaded data from data logger at Phykaa/Schkaa waterfall reintro. Staff weeded *Budasi* around plants. All *Phykaa* still alive in poor condition. Monitored Schobo PIL-B pop. #2 dead (needed to collect from), but found 27 individuals <5cm. Monitored Schobo PIL-C in corner of fence outplanted this year. 7 individuals have died, but all the rest look great.

Proposed Actions for NARs Oahu May 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done on this date?
Green (MB/SM)	5/12/08	Pahole	State/Army border fence	4	Snail baits, Ehrsti spraying, mending the snail jail, collecting Plapripri fruit, and Schnut cuttings from PAH-D 2 or 3, 43, 46, 44, 45.	Yes/No
Blue (JG/MW)	5/15/08	Kaena	Chacelkae KAE-B	4	Weed control around plants, and grass spray.	No, last trip there covered a lot of work; should schedule next month
Blue (JG/MW)	5/27/08	Kapuna	Kapuna Gulch	4	Check incipient weed populations.	Yes (2 ppl)

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Work Summary for Oahu NARs May

Blue Team

5/27/08: Checked *Ehrsti* along Mokuleia Trail (sprayed all spots where seen). Checked *Ehrsti* at TT's spot below proposed snail enclosure (none to treat). Treated *Ehrsti* at new spot near Delsub reintro above Mokuleia trail. Handpulled seedling/immature *Neowig* plants in clearing off Mokuleia trail. Surveyed and treated *Angeve* in Keawapilau Gulch (killed 6 small plants). Noted gametophyte/sporling beds on rocks; thousands of plants. Also killed a *Sphcoo* in the gulch with the *Angeve*. Monitored the newest Cyalon reintroduction in the old Phykaa fence. 3 plants are dead, but the rest are healthy. 3 of the remaining live plants have flowers.

Green Team

5/7/08: MB, RT, LB, LA, SM, PT checked the status of the snail enclosure and found the salt trough running low. Replaced the salt and sprayed all of the grass inside. Cleaned up the storage site and carried out the rubbish. Monitored Ehrsti sites, pulled all of the seed heads, and sprayed. Worked several hours weeding around the Cenagrgr outplanting site.

5/12/08: LB, PT, RT replaced all of the baits at the snail enclosure, monitored the Plapripri and observed that the fruit were very near maturity, and made collections from Schnut outplantings at switchbacks (PAH-D 2 or 3, 43, 46, 44, 45).

5/29/08: MB, DO Went up and collected seed from the Plapripri. Most of the seed had fallen already so collected what was left.

Proposed Actions for NARs Oahu June 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done on this date?
Green (MB/SM)	6/12/08	Pahole	Gulch 5	4	Weeding in and around outplanting site	Yes
Green (MB/SM)	6/16/08	Pahole	Snail jail, snare groups and gulch 3	4	Baiting at snail jail, checking snare groups and searching for pig sign	Yes
Blue (JG/MW)	6/17- 6/18/08	LKN	Manuwai/Palikea	4	Fence scoping	No
Blue (JG/MW)	6/23/08	Kapuna	Kapuna Gulch	4	Weed around rare plant populations, CyaLon fruit check	No, 6/24/08

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Work Summary for Oahu NARS June

Green Team

6/12/08: RT, LA, DF, and two interns checked weeded in gulch 5. Went above the waterfall and covered the area from the Cyasup fence to the waterfall and up the north facing slope.

6/16/08: LB, PT, RT, LA, RR, DS monitored the snare groups in gulch 1 and 2 and the two ridge groups between gulches 2 and 3. They all spent time surveying areas for pig sign as well.

Blue Team

6/24/08 MW, JG, ME, JF, KK, CLA, & AH monitored CyaLon pops KAP-B, PIL-B, PIL-C, & PIL-D, all plants that were fruiting had immature fruits. Weeding occurred North of the PIL-B population, and the RubArg site was retreated.

Report for NARs Oahu July 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done on this date?
Green (MB/SM)	7/14/08	Pahole	Fenceline, snail enclosure, and Cyalon PAH-A	6	Monitor fenceline, restock baiting grid, collect Cyalon fruit, weeding in and around Cyalon WCA.	Yes/No (Not all cyalon monitored-weather) (4pp)
Blue (JG MW)	7/1/08	LKN	Manuwai	6	Fence scope and Alemacmac monitoring	Yes 8 ppl fence scoping and monitoring rare plants.
Blue (JG MW)	7/9/08	Kaena	ChaCelKae.KAE-A&B	8	Monitor/fruit collection, weeding	No, 7/16/08
Blue (JG MW)	7/10/08	Kapuna	Kapuna/Keawapilau	8	AngEve Sweeps	No, 7/14/08
Blue (JG MW)	7/14/08	Kapuna	Fence line, CyaLon.KAP-B, PIL-B, C, D	8	Monitor fence, monitor fruit development	Yes

* = Request Doug Okamoto accompaniment on this date

** = Date requested by phone and/or email after initial actions submitted

Work Summary for Oahu NARS July

Blue Team

7/1/08: Scoped fence options for Manuwai Gulch. JR wrote summary and sent to NARS. Monitored *Melten*, *Nerang* (no plants), *Abusan*, *Caekav*, populations.

7/14/08 Checked Kapuna/Keawapilau fences, only minor gaps on bottom found. Swept *AngEve* in Keawapilau stream, four keiki pulled.

7/16/08 Checked ChaCelKae.KAE-A&B populations for fruit. Collected and rebagged plants in KAE-A. Plants at B were not ready for bagging, return in two weeks.

Green Team

7/14/08: SM, LB, PT, and LA monitored Pahole fence. LA and PT restocked rat baits and reset snap traps at Pahole Snail Exclosure. SM and LB monitored most of Cyalon PAH-A, but stopped because of heavy rainfall. No fruits ready to be collected from need plants.

7/16/08: SM and DT repairs to State Snail Exclosure. Replaced battery in solar charger, caulked small holes or gaps, re-secured windward facing side that was detached from T-posts, cut down stump next to exclosure and trimmed vegetation outside.

Proposed Actions for NARs Oahu August 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done on this date?
Green (DS/SM)	8/05/08**	Pahole	Schnut PAH-D (switchbacks) Delsub PAH-C & Cyasup PAH-B (below switchbacks) Schobo PAH-E & Cenagr PAH-D (near Schwepps Trailhead)	3	Monitor reintroduced plants	Yes but incomplete
Blue (JG MW)	8/6/08	Kaena	ChaCelKae.KAE-B	6	Monitor/fruit collection, weeding	No, 8/07
Green (DS/SM)	8/11/08	Pahole	Cenagr PAH-A Cyagri PAH-C Schobo PAH-D Cenagr PAH-D & Schobo PAH-E (along rim)	4	Monitor reintroduced plants	Yes but incomplete
Green (DS/SM)	8/12/08	Pahole	Cyasup PAH-A Chaher PAH-R Phykaa PAH-B	4	Monitor reintroduced plants	Yes but incomplete
Green (DS/SM)	8/13/08	Pahole	Cyalon PAH-A & I Schnut PAH-E (2210) Schkaa PAH-C & E Cenagr PAH-E	4	Finish monitoring Cyalon PAH-A & I (collect fruit) Monitor reintroduced plants	Yes and finished monitoring Phykaa B and Cyasub A.
Blue (JG MW)	8/18/08	Kapuna		6	Reintroduction monitoring	No, 8/20 & 8/21
Blue (JG MW)	8/20/08	Kaena	ChaCelKae.KAE-A&B	8	Monitor/fruit collection, weeding	Yes
Green (DS/SM)	8/25/08	Pahole	Snail Exclosure	2	Restock baits & reset snaps (Finish reintro monitoring if needed)	Yes
Blue (JG MW)	8/26/08	Manuwai		4	Scope fence	No

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Work Summary for Oahu NARS August

Blue Team

8/7/08: Kaena Bagged ChaCelKae.KAE-B fruit, weeded around western most population.

8/20-21/08 Kapuna/Keawapilau: Monitored reintroductions in Kapuna/Keawapilau (CyaLon.PIL-E, PhyKaa.KAP-B, DelSub.KAP-D, SchKaa.KAP-A). Monitored ChaHer.KAP-C & E, Checked incipient weed populations. Found single AngEve in HesArb gulch. Saw heavy pig activity in Hesarb gulch and lots of pig sign along Mokuleia trail.

8/20/08 Kaena: Collected fruit and removed bags from ChaCelKae.KAE-B.

Green Team

8/5/08: At Pahole, LA, LB, PT monitored Cyasub-B, Schnut-D, and Cenagr-D.

8/11/08: At Pahole SM, LA, PT, LB Delsub-C and Cenarg-A

8/12/08: At Pahole, SM, SCH, DT monitored: Chaher-R, Cyasub-A.

JR, PT monitored Schkaa C and E, Cyagri, Phykaa-B, Cenagr-B.

KK, LA, LB, and CK (Chad Koide) monitored: Cenagr-A, Schnut-E, Schobo-D and E, Cyaagri-C, Cenagr-D.

8/13/08: At Pahole, SM, LB monitored Schnut-E, and Cyalon-A and I. Cyalon-I also collected from. Schnut-E plants also photographed for further confirmation of identity of some of the outplants given similarity of appearance to Schpen.

LA, PT, CK finished monitoring Cyasub-A, and Phykaa-B.

Montanoa hibiscifolia also weeded in the area.

8/25/08: At Pahole, LA rebaited Pahole Snail Exclosure.

Proposed Actions for NARs Oahu September 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done on this date?
Blue (JG MW)	9/02/08	Kapuna	ChaHer.PIL-B, HesArb gulch	4	ChaHer.PIL-B fruit check, HesArb gulch weeding, DelSub.KAP-C monitoring	Yes
Blue (JG MW)	9/4/08	Kaena	ChaCelKae.KAE-B	6	Monitor/fruit collection, weeding	Yes
Blue (JG MW)	9/10/08	Manuwai	HedDegDeg.ANU-A, AleMacMac.ANU-C	4	Fruit check, „monitor AleMacMac	No
Green	9/11/08	Pahole	Gulch 4 Phykaa Reintro	2	Survey for Veronicellid slugs	No
Green (DS KW)	9/15/08	Pahole	Check gulch 4 for veronicidid slugs	2		Yes
Green (DS KW)	9/15/08	Pahole	ChaHer PAH-H,I Monitoring and bagging Cyalon PAH-A Monitoring collection Flunco PAH- A, B Airlayer check	4		Yes
Blue (JG MW)	9/22/08	Kapuna	ChaHer.PIL-B, HesArb gulch	4	ChaHer.PIL-B fruit check, Bag	No
Green (DS KW)	9/22/09	Pahole	Pahole Snail Exclosure	2	Re-bait Pahole Snail Exclosure	Yes
Green (DS KW)	9/29/08	Pahole	Gulch 4	2	Set beer traps out for slugs	No
Blue (JG MW)	9/30/08	Manuwai	HedDegDeg.ANU-A, AleMacMac.ANU-C	4	Fruit check, „monitor AleMacMac	Yes

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Work Summary for Oahu NARS September 2008

Blue Team

9/02/08: Kapuna Monitored ChaHer.KAP-B, not ready to bag return in 2-3 weeks. Monitored DelSub.KAP-C-002, plant was broken (looks like a branch fell on it) but still green. Heavy pig trails and tusk rubbings near plant, five pigs seen in gulch below near 001 site. Checked EhrSti site below trail, none found. Weeded in HesArb gulch near ChaHer.KAP-E-007.

9/4/08 Kaena: Bagged ChaCelKae fruit and weeded around patch.

9/30/08 Manuwai:

Green Team

9/15/08: At Pahole, DKS, LB monitored and collected from Cyalon A and Cyalon I. Collections completed for Cyalon for the year. *Montanoa hibiscifolia* also weeded in adjacent area. KW, LA monitored ChaHer H and ChaHer I in Gulch 2 area. Some ChaHer bagged return in about 3 weeks for more collection and bagging. Flunco A monitored (airlayer dead). Return for more airlayers

and monitoring of Flunco B. SJ, LA monitored Gulch 4 for Veronicilid slug species (still found to be present). LA found dead pig in snare in Gulch 2 area, approximately 3 weeks dead and about 40 lbs.

9/22/08: At Pahole, SH, LT rebaited Pahole Snail Enclosure.

9/29/08: Pahole trip cancelled. No deployment of beer baits for veronicilid slugs. Waiting until all supplies are in hand.

Proposed Actions for NARs Oahu October 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	# of Staff	Proposed Action	Action done?
Blue (JG MW)	10/06/08	Kaena	ChaCelKae.KAE-B	2	Remove ChaCelKae bags	Yes 2 ppl
Fence crew	10/6/08	Pahole	Gulch crossing to Pahole/Kahanahaiki junction	3	Hip chain spots requiring hip chain installation	
Blue (JG MW)	10/07/08	Kapuna	ChaHer.PIL-B, CyaLon.PIL-D, HesArb gulch, AngEve	4	ChaHer.PIL-B /CyaLon.PIL-D fruit check, HesArb gulch weeding, check ChaHer.KAP-E	Yes 6 ppl
Blue (JG MW)	10/15/08	Kapuna	Kapuna/Keawapilau	6	Fence check and incipient weeding	No, checked angeve instead 5 ppl (C. Miller recommended going to check fence in Dec instead)
Blue (JG MW)	10/22/08	Kapuna	ChaHer.PIL-B, HesArb gulch	4	ChaHer.PIL-B fruit check, Bag, weed	Saw that there was no frt to bag on prev. trip.
Green (DS/KW)	10/7/08	Pahole	Pahole Road	3	Pahole Road Spray	Yes
Green (DS/KW)	10/8/08	Pahole	Pahole Gulch 2, 3	4	Chaher PAH-F/G/H fruit check, Fluneo PAH-A/B airlayer collection.	Yes
Green (DS/KW)	10/9/08	Kaala	Boardwalk/Kamaohanui fenceline/Antennae outplanting site	8	Kaala Bog orientation, fenceline check, Labcyr outplanting monitoring, trap check, Schtri monitoring and collection	Yes
Green (DS/KW)	10/14	Pahole	Gulch 2, 3,4, snare line	10	Snare check and orientation, Chaher PAH-E, F, G, and H monitoring, collection, bagging and weeding, Fluneo PAH-A and B airlayering and collection. Gulch 4 veronicilid slug control.	Yes, snares checked, Cyalon monitored, Cenagr locations identified, no other rare plant actions
Green (DS/KW)	10/15	Pahole	Various sites, Gulches 1-5	8	Orientation hike with Talbert T.	No, instead Heddegdeg monitoring and collection only rare plant actions done.
Green (DS/KW)	10/16	Pahole	Various sites, Gulches 1-5	8	Backup date for orientation hike with Talbert T. Cenagr PAH-B, C, D, E, F collection. Schnut PAH-A and D monitoring and collection. Heddegdeg PAH-A and B monitoring and collection.	Schnut C,D collections made. Snail jail baited.
Green (DS/KW)	10/21-10/22	Kaala	Shelter area	8	Overnight camp for ginger control on army side, Schtri monitoring and collection	Kamoahuanui fenceline checked
Green (DS/KW)	10/27	Pahole	State Snail Exclosure	4	Rebaiting boxes, snaps and restocking salt trough. Plant monitoring collection as needed if unfinished from preceding dates.	No, baited on 10/16. Chaher collection done instead.

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Work Summary for Oahu NARS October 2008

Blue Team

10/06/08 Kaena: KLA and ME put on bags on 3 plants. Weeded around Chacelkae.

10/07/08 Kapuna: JG KF and ME weeded around Phykaa and Schkaa reintro, and wild Chaheer in Hesarb gulch. MW and KLA checked Chaheer and Cyalon. Chaheer Kap-B had lost all flowers seen last trip, will not be able to bag. Chaheer Kap-C also lost all flowers, will not be able to bag. Chaheer Kap-C-#7 will be able to bag in a few weeks (frts still pretty green). Cyalon Kap-B frt aborted, nothing to collect. Cyalon Pil-B: No fruit present on plants that need collection.

10/15/08 Keawapilau: MW, AH, KLA, KF, ME, treated Angeve with NARS staff.

Green Team

10/7/08 Pahole access road: Road sprayed

10/8/08 Pahole NAR: Chaheer E, F, G, H monitored, bagged fruits and collected. Fluneco A and C airlayers checked, all airlayers failed.

10/9/08 Kaala NAR: Labcyr antennae outplanting site briefly visited, old pig sign in area. Kamoahanui fenceline not checked.

10/14/08 Pahole NAR: Orientation hike with TT and NARS staff. Cenagr locations identified, Cyalon in left fork of Gulch 2 monitored, snares checked.

10/15/08 Pahole NAR: Heddegdeg Pah-A, B monitored and collected. Finished fruiting for the year. No further monitoring trips planned. No other rare plant actions on this day.

10/16/08 Pahole NAR: Schnut Pah-C, D monitored and cuttings collected. Pahole snail jail re-baited and re-salted.

10/21/08 Kaala NAR: Kamoahanui fenceline checked. No repairs needed.

10/27/08 Pahole NAR: Chaheer G, H, F bagged and collected fruits.

Proposed Actions for NARs Oahu November 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done?
Blue (JG MW)	11/06/08	Kapuna	Hesarb gulch	2	Check Fluneo airlayers, Bag ChaHer Kap-E	Yes
Blue (JG MW)	11/17/08	Kapuna	Hesarb gulch	4	Check ChaHer Kap-E Bags; Weed in area.	Checked fruit, did not weed
Blue (JG MW)	11/18/08	Kapuna	Units I,II, III & IV fences	4	Check fence	Yes, early, was due 12/1
Green (DS/KW)	11/12/08	Pahole	Gulches 1-5 ChaHer G, H, F gulches, various sites.	5	Collect from ChaHer, weed various reintro sites, site prep various existing sites for Dec. reintroduction. Fluneo Pah-A monitoring. Cyagrioba Pah-B monitoring.	Yes, collected from ChaHer PAH-G, weeded outplant site Cyagrioba gulch 5, ChaHer PAH-R gulch 3. Found Angeve in gulch 3 – herbicided. No Fluneo check.
Green** (DS, KW)	11/13/08	Pahole	Gulch 2	2	Cenagr PAH-?/? collection, Cyagrioba PAH-? monitor	Yes, #? cuttings given to LC
Green (DS/KW)	11/18/08	Pahole	Gulches 1-5 Snail jail Fenceline	8	Heli-ops: Skirting material and salt/bait to snail jail and Pahole fence line. Various reintro site weeding and site prep as needed.	
Green (DS/KW)	11/24/08	Pahole	Fenceline	2	Fenceline check	
Green (DS/KW)	11/25/08	Kaala	Kaala camp site	8	Overnight camp for actions in SBW	

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Work Summary for Oahu NARS November 2008

Blue Team

11/06/08 Kapuna: JG and CR put four bags on six fruit on ChaHer.KAP-E.007. Removed two airlayers from FluNeo.KAP-A, both failed. One had a good callus, however, appeared to have been bored. The other may have dried out as the plastic was loose.

11/17/08 Kapuna : ME and KF checked bags at ChaHer.KAP-E.007, fruit not ripened just yet. 007 still has 5 unbagged fruits. Will check in two weeks. 003 vigor is declining.

11/18/08 Kapuna: Fence check, all fences good. Scheduled for 12/1 but Ohikilolo trip was rained out, so good rain day activity.

Green Team

11/12/08 Pahole: Outplanting site preparation at Cyagri PAH-C, Delsub PAH-C, Delsub PAH-C, Schnut PAH-E, Cyagri PAH-D, Chahe PAH-R; Pulled off remaining bags on Chahe PAH-G.

11/13/08 Pahole: LB and JH - Cenagr PAH-D cuttings collected; Monitored Cyagri PAH-C for fruit collection, 5 fruit still not ripe enough.

11/18/08 Pahole: DS and DA Pahole fence check. Minor repairs needed along fence, gear to be flown in early December for repairs. KW and SS outplanting site preparation at 2210, Switchbacks, and Bill Garnett site. LA and JH Snail baits and salt exclosure.

11/19/08 Pahole: MK collected Cyagri PAH-C fruit. No other collection needed, goal met.

11/24/08 Pahole: DS and DA completed fence line check along fence separating Kahanahaiki and Pahole. See fenceline check and repair form to be sent shortly to C. Miller.

Proposed Actions for NARs Oahu December 2008
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done?
Blue (JG MW)	12/1/2008	Kapuna	Hesarb gulch	4	Check ChaHer Kap-E Bags; Weed in area, check incipients	yes
Green	12/4/2008	Pahole	Gulch 4	2	Deploy beer traps for slugs	yes
Green	12/8/2008	Pahole	Gulch 4	2	Retrieve beer traps for slugs	Yes
Blue (JG MW)	12/09/08	Kaena	ChaCelKae patch	2	Common outplanting (MyoSan) with GM	No, 12/23-12/24
Green (KW DS)	12/9-12/11	Pahole	Gulch 3/5; along rim	8	Reintro into Cyagri PAH-D; Reintro into Cyasup PAH-A; Reintro into ChaHer PAH-R; Reintro Schnut/Cenagr into 2210; Reintro Schnut into Switchbacks; Reintro Delsub into Bill Garnett site; Reintro Cyagri below snail jail	Yes
Blue (JG MW)	12/10-12/11	LKN	HibBra patches	6	Monitor all HibBra	No
Blue (JG MW)	12/15-12/16	LKN	Palikea/Alaihei he	3	Snail Monitoring	No
Blue (JG MW)	12/17	Kapuna	Hesarb gulch	2	Check ChaHer Kap-E Bags	No, 12/15
Green (KW DS)	12/17	Pahole	Snail Jail	2	Snail Jail baits/repair	Yes 12/15
Green (KW DS)	12/23	Pahole	Pahole fenceline	10 (fence crew and green tm)	Skirting from Northern corner to hypolon and bottomline strengthening at various sites along Makua rim	Yes. Received gear on 12/30 and 12/31

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Work Summary for Oahu NARS December 2008

Blue Team

12/1/08 Kapuna: Incipient weeding, checked bagged fruits at ChaHer.KAP-E.007 to see if seeds ready to collect. 2 of 4 bags were no longer on fruits, and fruits were rebagged. Fruit had dehisced in 1 bag, but no seeds present. 3 bags left on plant (2 with 1 fruit each, 1 with 3 fruits).

12/23-24 Kaena: Outplanted EraVar & MyoSan with Greg Mansker. 200 EraVar were tagged and map to monitor, 30 MyoSan were mapped and tagged. Crew also helped GM with SesTom and CapSan outplanting.

Green Team

12/8/08 Pahole: Twenty four mason jars with beer deployed in Pahole Gulch 4 to control slugs. Traps placed at lower PhyMol outplanting site in an area approximately 20 by 20 m square (Lon: -158.18673620799845; Lat: 21.539798748349643)

12/9/08 Pahole: Outplanting day. Cyagri PAH-D (Gulch 5), Schkaa PAH-C (Gulch 5), Cenagr PAH-F (ridge between gulch 4 and 5), Cyasup PAH-A (Gulch 3), Chahe PAH-R (Gulch 3), Delsub PAH-C (Bill Garnets site), Schnut PAH-E (Switchbacks), Cyagri PAH-C (Below the state snail enclosure), Schobo PAH-D (Below the state snail enclosure), Cenagr PAH- A (Above the state snail enclosure), Cenagr PAH-D (Past the reveg. road).

12/10/08 Pahole: Slug beer traps collected – 3 slugs trapped per jar (mean number). One *Veronicella cubensis* captured (incipient species), 20 *Limax maximus* and 52 *Deroceras reticulatum*.

12/15/08 Pahole: Fence check after wind storm. A few small branches were removed from fence- no damage was done. Hypolon was blown out about 3 feet and was fixed.

12/30/08 Pahole Received 1 load of gear on Pahole fence before weather came in.

12/31/08 Pahole Received the 2 left over loads along Pahole fence.

Proposed Actions for NARs Oahu January 2009
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done?
Blue (JG MW)	1/5	Kapuna	Hesarb gulch	2	Check ChaHer Kap-E Bags; Weed in area, check incipients	yes
Blue (JG MW)	1/5	LKN	Road	2	Repair road if possible	yes
Blue (JG MW)	1/7-1/8	LKN	HibBra patches	6	Monitor all HibBra	yes
Blue (JG MW)	1/7-1/8	LKN	Palikea/Alaihei	2	Snail Monitoring	no

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Work Summary for Oahu NARS January 2009

Blue Team

01/05/09 LKN: repaired LKN road in ranch area with Rueben.

01/07-08/09 LKN: camped at Ka'ala Hilton for HibBraMok surveys makai of LKN.

01/12/09 Kapuna: removed bags at ChaHer.KAP-E.007, downloaded data from weather station at PhyKaa outplanting in HesArb gulch.

Green Team

1/5-1/6/09 Pahole: Skirting completed along fenceline near road down to Hypolon.

1/5/09 Pahole: Twenty four mason jars with beer deployed in Pahole Gulch 4 to control slugs. Traps placed at lower PhyMol outplanting site in an area approximately 20 by 20 m square (Lon: -158.18673620799845; Lat: 21.539798748349643).

1/12/09 Pahole: Slug beer traps collected – 5 slugs trapped per jar (mean number). Zero *Veronicella cubensis* captured (incipient species), 19 *Limax maximus* and 90 *Deroceras reticulatum*.

1/15/09 Pahole: Invasive snail survey around the recent reintroductions.

1/26/05 Pahole: Refilled beer traps in Gulch 4.

Proposed Actions for NARs Oahu February 2009
(Pahole, Kapuna & Keawapilau, Lower Kaala, Kaena)

Team	Date	General Location	Specific Location	Number of Staff	Proposed Action	Action done?
Blue (JG MW)	2/10	LKN	HibBra patches & Kaawa	6	Revisit HibBra Makai of NAR and Kaawa HibBra & FluNeo	2/24, Fence scope
Blue (JG MW)	2/23	Keawapilau	SchObo outplanting RubArg	4	Herb RubArg	No, rescheduled
Green	2/10?	Pahole	Makua rim	3	Fly in of fence material for repair when Kapuna fence material goes in	No
Green	2/3	Pahole	Gulch 4	2	Slug trapping	Yes
Green	2/10	Pahole	Gulch 4	2	Slug trapping	Yes
Green	2/17	Pahole	Gulch 4	2	Slug trapping	Yes, 2/26 traps pulled
Green	2/17-2/18	Kaala	Shelter	5	Overnight camp for work on Army lands	Yes
Green	2/24	Pahole	Snail Jail/Cyagri reintro	4	Salt and bait re-stocking, repair of hot wire, weeding of Cyagrioba reintro area	No, rescheduled for 2/26
Green	2/25-26	Pahole	Gulches 3-5	6	Weeding of reintro sites	Yes, 2/26 only
Fence	2/9-12	LKN	Fenceline clearing	6	Begin clearing fence line on eastern ridge	
Fence	2/16-19	LKN	Fenceline clearing	6	Continue clearing fence line on eastern ridge	
Fence	2/23-26	LKN	Fenceline clearing	6	Continue clearing fence line on eastern ridge	

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Work Summary for Oahu NARS February 2009

Blue Team

2/24 LKN: Alaiheihe/Palikea/Kaimuhole/Puulu fence scope.

Green Team

2/3/09 Pahole: Slug beer traps collected – 3 slugs trapped per jar (mean number). Zero *Veronicella cubensis* captured (incipient species), 23 *Limax maximus* and 43 *Deroceras reticulatum*.

2/10/09 Pahole: Slug beer traps collected (count pending) and rebaited

2/17/09 Pahole: Slug beer traps collected (count pending) and rebaited

2/18-2/19 Kaala: Checked Kamoahuanui fenceline and road fenceline. No major repairs needed. Checked Festuca grass infestation at Radio tower but could not do followup spray due to weather.

2/26/09 Pahole: Slug beer traps collected (count pending). Trap out concluded, no *Veronicella cubensis* found on this date.

2/26/09 Pahole: Snail jail rebaited, hot wire repaired. Wire still needs complete replacement for effectiveness.

Weeding: Gulch 5 Schkaa and Cyagri reintro. Gulch 3 Cyasub reintro. Delsub reintro at old Bill Garnett site (still needs followup). Cyagri reintro next to snail jail not weeded (still needs weeding).